Digital Transformation in Higher Education

PART A

Best Practices and Challenges

EDITORS

Miltiadis D. Lytras, Andreea Claudia Serban, Afnan Alkhaldi, Sawsan Malik and Tahani Aldosemani

Digital Transformation in Higher Education, Part A

EMERALD STUDIES IN ACTIVE AND TRANSFORMATIVE LEARNING IN HIGHER EDUCATION

Series Editor: Miltiadis D. Lytras, College of Engineering, Effat University, Jeddah, Kingdom of Saudi Arabia

Filling a significant gap in the body of knowledge related to the emerging agenda of active and transformative learning strategies, Emerald Studies in Active and Transformative Learning in Higher Education is a helpful resource for policy-makers, curriculum designers, and school leaders aiming to develop value-based strategies for promoting quality education with an emphasis on active and transformative learning techniques.

In This Series

Active and Transformative Learning in STEAM Disciplines: From Curriculum Design to Social Impact
Edited by Miltiadis D. Lytras

Digital Transformation in Higher Education, Part A: Best Practices and Challenges

EDITED BY

MILTIADIS D. LYTRAS
Effat University, Saudi Arabia

ANDREEA CLAUDIA SERBAN
Bucharest University of Economic Studies, Romania

AFNAN ALKHALDI
Arab Open University, Kuwait

SAWSAN MALIK
Arab Open University, Kuwait

AND

TAHANI ALDOSEMANI
Prince Sattam bin Abdulaziz University, Saudi Arabia

United Kingdom – North America – Japan – India – Malaysia – China

Emerald Publishing Limited
Emerald Publishing, Floor 5, Northspring, 21-23 Wellington Street, Leeds LS1 4DL

First edition 2024

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library

ISBN: 978-1-83549-481-3 (Print)
ISBN: 978-1-83549-480-6 (Online)
ISBN: 978-1-83549-482-0 (Epub)

This volume is specifically devoted to the individuals who possess exceptional foresight and are at the forefront of implementing and advancing the process of converting traditional education into a digital format within the higher education sector. This work pays tribute to those who successfully combine traditional teaching methods with cutting-edge artificial intelligence as we approach a transformative technological era in education. It is dedicated to educators, students, and leaders who have the courage to innovate and create conditions where technology enhances learning and human potential. May it serve as inspiration to continue the path toward a future where education transcends boundaries and promotes global understanding and cooperation.

This page intentionally left blank

Contents

About the Editors

Miltiadis D. Lytras is an expert in advanced computer science and management, editor, lecturer, and research consultant, with extensive experience in academia and the business sector in Europe and Asia. Dr Lytras is a Research Professor at Deree College – The American College of Greece and a Distinguished Scientist at the King Abdulaziz University, Jeddah, Kingdom of Saudi Arabia. Dr Lytras is a world-class expert in the fields of cognitive computing, information systems, technology enabled innovation, social networks, computers in human behavior, and knowledge management. In his work, Dr Lytras seeks to bring together and exploit synergies among scholars and experts committed to enhancing the quality of education for all. Dr Lytras has coauthored more than 120 high impact factor papers in Q1 and Q2, Web of Science and Scopus indexed Journals such as: *IEEE Transactions on Knowledge and Data Engineering*, *IEEE Internet Computing*, *IEEE Transactions on Education*, *IEEE Access*, *Future Generation Computer Systems*, *Journal of Business Research*, *International Journal of Information Management*, *Journal of Innovation and Knowledge*, *Technological forecasting and Social Change*, *Journal of Ambient Technology and Humanized Computing*, *World Wide Web Journal*, *Computers in Human Behavior*, *Studies in Higher Education*, *Telematics and Informatics*, *Information Systems Management*, *IJ of Engineering Education*, *Journal of Universal Computer Science*, *Journal of Knowledge Management*, *British Journal on Education Technology*, *Interactive Learning Environment*, *Educational Technology and Society*, *Behavior and Information Technology*, etc.

Professor Andreea Claudia Serban is a Professor at the Department of Economics and Economic Policies, Faculty of Theoretical and Applied Economics and Director of Doctoral School of Economics. She holds a PhD in Economics from Bucharest University of Economic Studies and a post-PhD in Economics from Romanian Academy of Science. Her research activity consists of publication of 7 books and numerous economic studies in highly ranked journals and participation in many international conferences. She is an Associate Editor for International Journal on Semantic Web and Information Systems (IJSWIS – WoS indexed journal) and Editor in Chief for Global Journal of Business, Economics and Management: Current Issues (journal indexed in many international databases). She is reviewer for prestigious international journals and member in editorial board or organizing committee of many international conferences. She is an expert for Lithuania Research Council. Her areas of research interest include

sustainable development, smart development, knowledge economy, labor market, education, and demographic issues.

Dr Afnan Alkhaldi is an Assistant Professor at the Arab-Open University, Kuwait branch. She is a leading expert in smart cities, information systems, and e-governance, with a PhD in Operation and Information Management. With extensive experience in smart city development, she combines innovation, efficiency, and a results-oriented approach to her work. Currently, she serves as a Consultant for the Al-Hareer Smart City project in Kuwait, where she applies her expertise to enhance economic development and urban planning. Dr Afnan's contributions are pivotal in shaping sustainable urban futures.

Dr Tahani Aldosemani is an expert in the field of educational technology, currently serving as the Program Director for Skills and Lifelong Learning at the Education and Training Commission. She also holds the position of Associate Professor of Educational Technology at Prince Sattam bin Abdulaziz University, and the University's Council Member. Her previous roles include Vice Dean of Information Technology and Distance Education at the same university and a consultancy position for the Saudi Arabian Minister of Education, focusing on e-learning and international cooperation. She also served as co-chair for the G20 2020 Education group. Dr Tahani earned her PhD in Educational Technology and a Diploma in Curriculum and Instruction from the University of Wyoming, USA. She is a Certified Professional in Talent Development from the Association of Talent Development, an alumnus of the MIT Digital Transformation program, and holds a certificate in Online Learning Global Leadership from the Online Learning Consortium. Dr Tahani has received several international awards and recognitions in educational research and has many publications in educational technology and digital transformation in education. She led many successful initiatives in education presented at different conferences, seminars, and workshops.

Dr Sawsan Malik is an Assistant Professor at the Arab-Open University, Kuwait branch, specializing in smart city management, gig and circular economies, eco-innovation, entrepreneurship, sustainable development, the informal economy, e-government, and digital transformation. She focuses on qualitative research methods, including grounded theory and ethnography. Malik serves as a peer reviewer for several notable journals in entrepreneurship, management, hospitality, and social sciences.

About the Contributors

Husa Alangari Assistant Professor of Instructional Systems Technology at the College of Education and Human Development at Princess Nourah bint Abdulrahman University (PNU), consultant, speaker, and EdSafe AI 2024 Women in AI Fellow in Riyadh, Saudi Arabia. She received her MSEd and PhD in Instructional Systems Technology from Indiana University (IU) – Bloomington. Her professional work experience spans over 20 years in K-12, higher education, and consulting. Her research focuses on instructional design, artificial intelligence in education, professional development (reskilling and upskilling), and innovative learning pedagogies and practices. She is the recipient of the 2024 Top 15 Women Leader Middle East Award, the 2024 SHELEADS Technology and Beyond Award, the 2023 Education 2.0 Outstanding Leadership Award, the 2021 Technology, Instruction, Cognition, & Learning SIG's Outstanding International Research Collaboration Award from the American Educational Research Association, and a nominee of the 2019 Martin Luther King Building Bridges Award from IU.

Dr Muhammad Mujtaba Asad is serving as an Assistant Professor and Lead Researcher of Educational Technologies and TVET Research at Sukkur IBA University and Honorary Adjunct Faculty at Sohar University, Oman. Dr Mujtaba has national and international working experience of more than 10 years at industrial and educational sector in the domain of educational technologies, work and product-based education, and technical and vocational education. Dr Mujtaba has published more than eighty-five (85) research articles (WoS & Scopus Indexed) in reputed international journals and conferences worldwide.

Dr Senad Bećirović is a distinguished Full Professor at the University College of Teacher Education Lower Austria. With over 20 years of extensive teaching experience across various educational levels and institutions, he has established himself as a leading academic figure. Professor Bećirović is the prolific author of four books and 56 scientific articles. His work has garnered recognition from prestigious publishers such as Springer, Sage, Wiley, and Taylor & Francis and is indexed in renowned databases including WoS, Scopus, Q1, and Q2. His academic contributions have significantly impacted the fields of artificial intelligence in education, digital technologies in teaching and learning, intercultural education, fostering giftedness, and foreign language learning. In addition to his written work, Dr Bećirović is a sought-after speaker, having presented his research findings as both a keynote and regular speaker at numerous international conferences. His innovative research and insights continue to influence and inspire educational practices worldwide.

Naif Jabli, King Khaled University, Kingdom of Saudi Arabia. PhD in Instructional Technology Research and Assessment from Northern Illinois University in the United States. Graduated in 2018, became the Dean of the Deanship of E-Learning in 2020. Now, General Manager of the Center for Design Thinking and Digital Platforms at KKU. Published articles and papers about e-learning and digital transformation such as: "Develop an electronic training environment based on the KKUx platform to develop instructional design skills Instructional design specialists in education and training institutions have"; "The degree of the teaching staff's awareness of the skills of artificial intelligence in education and its relationship to experience and training programs at King Khalid University" "The Usability of King Khalid University Website: Assessing Effectiveness, Efficiency, And Satisfaction" and "Integration between Digital Platforms and Artificial Intelligence Applications on the Development of Engagement Skills in Learning among University Students."

Boris Mattoš, PhD, is an Associate Professor at the Department of International Economic Relations and Economic Diplomacy, Faculty of International Relations at the University of Economics in Bratislava, Slovak Republic. After studies at the Comenius University in Bratislava, he completed postgraduate studies at the Humboldt University in Berlin and at the University of Zürich in Switzerland. In 2009, he completed his PhD studies in the field of International Relations at the University of Economics in Bratislava and in 2017 the habilitation at the University of Sopron, Hungary. Boris has more than 20 years of teaching experience. In teaching and research, he focuses on selected topics of international relations. He is also an active member of a number of national and internationally renowned expert commissions on international cooperation and educational training.

Carolina Pereira holds a PhD in Education, specialized in the field of teacher education, and she is an invited Assistant Professor at the Institute of Education, University of Lisbon. Since 1998, she has worked in distance and online learning programs with teachers and other education professionals. Has worked as an Instructional Designer and supports quality training development systems (both face-to-face, hybrid and online). Actively involved in projects concerning the digital skills development of adults and teachers, including digital technologies in the classroom. She has experience in working with international cooperation and development projects in international contexts since 2001.

Dr Ola Raddaoui draws upon a wealth of intercultural experiences from North Africa, the Middle East, and the United States. With a PhD in Curriculum and Instruction, she has conducted extensive research on online learning for international graduate students. Her Master's degree in Global and Area Studies deepened her understanding of cultural dynamics and social change. Currently serving as a Lecturer in the Religious Studies and Gender and Women Studies Department at the University of Wyoming, Ola brings a unique, diverse, and global perspective to her teaching. Her areas of interest include teaching pedagogy and online learning technology, with a particular focus on teaching English and Arabic.

Dr Ali H. Raddaoui is a Fulbright Scholar and a mission-oriented, vision-driven Researcher and Teaching Practitioner with an intercultural outlook gained from extended exposure to educational systems in North Africa, the Middle East, the United Kingdom, and the United States. Ali is an Adjunct Associate Professor with the University of Wyoming's School of Politics, Public Administration, and International Studies. As a trained Applied Linguist, he has an active research agenda and extensive experience teaching English, Arabic, and French to speakers of other languages. His interests include best practices in language learning and teaching, the interface of learning and technology, and creative writing.

Ana Luísa Rodrigues is an expert in teacher education and ICT in education. She studies teacher education, digital technology integration, active learning, adult education, experiential learning, entrepreneurship education, and economics and accounting education. She is an Assistant Professor and Researcher at the Institute of Education, University of Lisbon, where teaches at undergraduate, Master, and doctoral levels and has participated in various research projects. She has several peer-reviewed publications and is an editor and a reviewer for international journals.

Dr Fahad Sherwani is serving as an Assistant Professor at National University of Computer and Emerging Sciences, Pakistan. Dr Fahad has published several research articles and also three books with Taylor & Francis and CS publishers in his publication credit. Dr. Fahad has also been awarded the title of approved PhD and MPhil/MS supervisor by Higher Education Commission of Pakistan.

Shahzeen Younas has completed her Bachelor's in education from Sukkur IBA University, Sindh, Pakistan. Her research interest areas are game-based education, AI in education, teacher education, digitalization in education, machine learning, and data science. She has published several research articles in well-reputed international journals.

This page intentionally left blank

Preface

As the 21st century unfolds, the debate on digital transformation is impacting all sectors of society (Alsaywid et al., 2023; Aldosemani, 2023a; Alkhaldi et al., 2023; Şerban & Lytras, 2020). Higher education, a beacon in the knowledge dissemination and creation, is challenged by the entire digital transformation strategy and ecosystem. At this pivotal moment in time, higher education institutions find themselves facing diverse transformative forces, with artificial intelligence (AI) at the forefront, promising to reshape educational landscapes. AI tools like OpenAI ChatGPT can revolutionize education, research, learning, professional development, and accreditation processes. By using these tools, institutions can enhance active and transformative learning experiences. Additionally, they can efficiently manage new challenges, increasing the effectiveness and relevance of education (Lytras, 2023b).

Globalization has transformed all the sectors of economic, social, cultural, political, environmental life, as well as education systems, particularly higher education systems. Traditionally, higher education has been more open to the international context compared to other domains. Education is a key element in shaping the global environment, and it plays a central role in ensuring the economic and social security of a nation (Şerban & Jianu, 2023; Şerban & Lytras, 2023). However, the higher education institutions are being affected differently by the process of globalization. Some of them are passive actors, objects/subjects of globalization, while others are more actively engaged, being key actors of this process. Digital transformation has brought a unique perspective to educational landscape. In this new context, identifying, standardizing, assessing, and rewarding talent, skills, and competencies are imperative (Aldosemani et al., 2019). A strategic approach should align and interconnect value drivers such as research and educational strategy, curriculum development, instructional design, knowledge dissemination, skills management, employment acquisition, and professional growth (Lytras & Alsaywid, 2023).

The acceleration of digital transformation in higher education brings with it a unique set of challenges. One of the greatest is the task of seamlessly integrating advanced technologies, such as AI, into longstanding pedagogical frameworks while preserving the invaluable human element of teaching. Institutions are tasked with fostering environments that promote active and transformative learning, aiming to bridge digital divides and create inclusive progress. Active learning is encouraged through interactive activities, discussion, and collaboration, facilitating effective and flexible learner collaboration in a supportive community, enabling authentic dialogue and learning experiences (Aldosemani, 2023b). Active learning defines a synergetic, collaborative, and exploratory learning, contributing to increased and

long-lasting learning outcome (Lytras & Housawi, 2023). Collaborative knowledge sharing in classrooms enhances active engagement among students and instructors. Exploring the link between innovation and sustainability in education highlights the importance of adapting curriculum and research practices to meet evolving needs (Lytras, 2023a).

The rapid evolution of technology demands a corresponding evolution in our approaches to teaching and assessment, calling for a paradigm shift in educational philosophy (Lytras et al., 2022; Malik & Mantas, 2021). It seems that in the current evolution and development of higher education, there is a crucial need to reinvent the unique value proposition of procedures and strategies toward enhanced student experience and learning outcomes. Considering the increased reliance on digital technologies, addressing digital exclusion is crucial to ensuring equitable access to education and other essential services, thus improving the overall quality of life and reducing societal disparities (Alkhaldi, 2022).

The underlying philosophy of the first volume of our edition centers on the symbiotic relationship between technology and human-centric pedagogy with social foot print (Alkhaldi et al., 2024). Each chapter explores a distinct facet of this digital transformation journey in higher education, guiding readers through the ways in which higher education can embrace digital transformation while remaining substantial in its commitment to student-centric learning and teaching.

Each chapter in this volume navigates a dimension of the digital transformation integration and utilization in higher education.

- Setting the Emerging Landscape: This section lays the foundation, charting the pillars of the digital transformation in higher education. It is also about how AI reshapes and re-engineers our educational ecosystems.
- Threats, Promises, and Strategies: Here, the authors comment on the potential risks and rewards of digital transformation and AI, contemplating the strategic paths forward.
- Active and Transformative Learning: Authors discuss the foundations and the use of AI chatbots in higher education, examining their impact on engaging adult learners in meaningful educational journeys.
- Inquiry-Based Pedagogical Practices: The power of AI-driven natural language processing is explored to enhance digital game-based learning, fostering a more inquisitive, exploratory, and personalized educational experience.
- The Rise of Micro-Credentials: Authors in these chapters discuss the capacity of micro-credentials that emerge as a novel paradigm, signaling a shift toward more personalized, granular learning pathways in higher education.
- Deploying AGI: With the advent of Artificial General Intelligence (AGI), authors elaborate on the future possibilities and implications for academia, students, and faculty.
- Innovative Learning Strategies: This chapter discusses learning strategies that harness digital tools to revolutionize learning experiences.
- The AI Revolution 2030: In this concluding chapter, the authors vision the future and discuss use cases and AI-enabled services that take higher education to the next level of learning capacity and skills building.

In Fig. 1, we provide a graphical overview and synopsis of the coverage of the first volume of our edition.

The successful implementation of a digital transformation (DT) strategy in higher education is indeed multifaceted and complex. It demands robust infrastructure, visionary leadership, and a culture that embraces continuous innovation. However, at the heart of this transformation lies the indispensable human element. This volume emphasizes that DT must be inherently human-centric, creating educational environments that not only impart knowledge but also nurture individuals who will positively impact society.

As we venture into this digital dawn, we hold a dual commitment: to harness the immense capabilities of AI and other advanced technologies and to preserve the essence of education as a human endeavor that enriches both the intellect and the soul. It is through this symbiotic relationship between technology and humanity that we can forge a transformative path forward, shaping a brighter future for higher education and the world it serves.

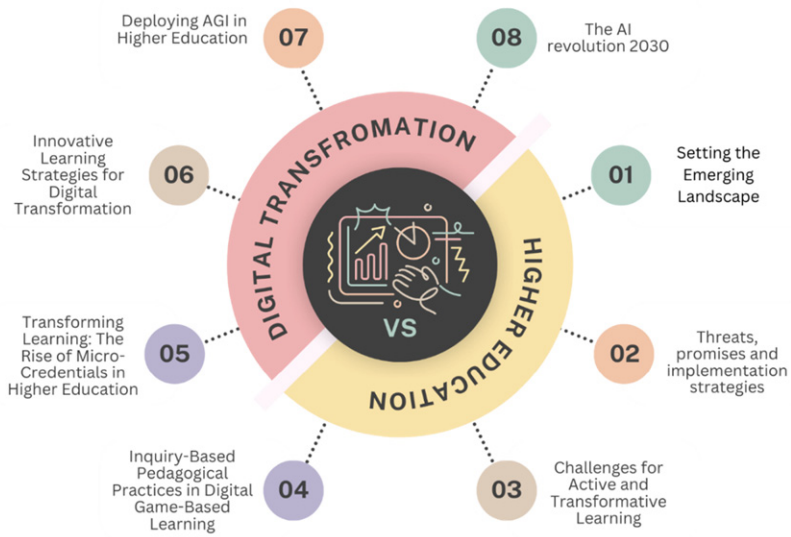

Fig. 1. A Snapshot of the DT Themes, Volume Coverage. *Source:* Authors.

References

Aldosemani, T. I. (2023a). e-school initiatives that instigated digital transformation in education: A case study according to SABER-ICT framework. In *Recent advances in data and algorithms for e-government* (pp. 23–54). Springer International Publishing.

Aldosemani, T. (2023b). Adopting HyFlex course design: Actions for policymakers, researchers, and practitioners. In *Active and transformative learning in STEAM disciplines* (pp. 197–227). Emerald Publishing Limited.

Aldosemani, T., Shepherd, C. E., & Bolliger, D. U. (2019). Perceptions of instructors teaching in Saudi blended learning environments. *TechTrends*, *63*, 341–352.

Alkhaldi, A. N. (2022). Digital exclusion during the COVID-19 pandemic: A review of how developed countries responded to support their citizens. *International Journal of Electronic Government Research*, *18*(1), 1–19.

Alkhaldi, A., Alrashidi, H., Alhasan, K., Alsadeeqi, A., & Alshami, A. (2023). *The use of blockchain technology to build smart cities: Creating public value in Kuwait*. Global Knowledge, Memory and Communication.

Alkhaldi, A., Malik, S., Alhaimer, R., Alshaheen, A., & Lytras, M. D. (2024). Translating a value-based framework for resilient e-learning impact in post COVID-19 times: Research-based Evidence from Higher Education in Kuwait. *Heliyon*, *10*(2).

Alsaywid, B. S., Qedair, J., Alkhalifah, Y., & Lytras, M. (2023). Research and education skills as a core part of digital transformation in healthcare in Saudi Arabia. In *Digital transformation in healthcare in post-COVID-19 times* (pp. 205–216). https://doi.org/10.1016/B978-0-323-98353-2.00010-1

Lytras, M. (2023a). An integrated transformative learning strategy at national level: Bold initiatives toward vision 2030 in Saudi Arabia. In *Active and transformative learning in STEAM Disciplines: From curriculum design to social impact* (pp. 281–296). https://doi.org/10.1108/978-1-83753-618-420231014

Lytras, M. (2023b). Forty definitions and metaphors for active and transformative learning in ChatGPT times: ChatGPT as an active and transformative technology enhanced learning boost in healthcare education. In *Technology-enhanced healthcare education: Transformative learning for patient-centric health* (pp. 19–34). https://doi.org/10.1108/978-1-83753-598-920231002

Lytras, M., & Alsaywid, B. S. (2023). Next generation healthcare education and research: Utilizing the talent, skills, and competencies for value-based healthcare. In *Active learning for digital transformation in healthcare education, training and research* (pp. 211–220). https://doi.org/10.1016/B978-0-443-15248-1.00005-9

Lytras, M., & Housawi, A. (2023). Active learning in healthcare education, training, and research: A digital transformation primer. In *Active learning for digital transformation in healthcare education, training and research* (pp. 1–11). https://doi.org/10.1016/B978-0-443-15248-1.00006-0

Lytras, M., Serban, A. C., Ruiz, M. J. T., Ntanos, S., & Sarirete, A. (2022). Translating knowledge into innovation capability: An exploratory study investigating the perceptions on distance learning in higher education during the COVID-19 pandemic - The case of Mexico. *Journal of Innovation and Knowledge*, *7*(4). https://doi.org/10.1016/j.jik.2022.100258

Malik, S., & Mantas, C. (2021). The adoption of social media platforms in informal home-based businesses in Kuwait. *Humanities and Social Sciences Letters*, *9*(3), 273–287.

Şerban, A. C., & Jianu, I. (2023). Developing an economic and social security index for Euro-Atlantic area countries: A panel data analysis. *Journal of Business Economics and Management*, *24*(1), 112–135.

Şerban, A. C., & Lytras, M. D. (2020). Artificial intelligence for smart renewable energy sector in Europe—Smart energy infrastructures for next generation smart cities. *IEEE Access*, *8*, 77364–77377.

Şerban, A. C., & Lytras, M. D. (Coordinators). (2023). *The economic and social security in the Euro-Atlantic Space. Actors, instruments, trends*. Bucharest University of Economic Studies Publishing House, Bucharest, Romania.

This page intentionally left blank

Acknowledgments

We would like to express our heartfelt thanks to all of our chapter authors for their valuable contributions. It has been a great pleasure and honor to embark on this journey together; we highly appreciated the opportunity to collaborate with experts in the field of digital transformation in higher education. Additionally, we are profoundly grateful to the books team at Emerald Publishing, especially Lydia Cutmore, Kirsty Woods, and Lucy Loveday, for their commitment, professionalism, and continuous support in advancing our project. We also appreciate the meticulous editorial support provided by Pavithra Muthu. Working with each of these individuals has been a privilege, and we are thankful for their support, expertise, shared perspectives, and willingness to share their valuable work and experiences with us.

Furthermore, we acknowledge our colleagues and students who inspired us to initiate this very timely project during a period of rapid changes in higher education.

This page intentionally left blank

Chapter 1

Digital Transformation in Higher Education in Times of Artificial Intelligence: Setting the Emerging Landscape

Miltiadis D. Lytras[a], *Andreea Claudia Serban*[b], *Afnan Alkhaldi*[c], *Tahani Aldosemani*[d] *and Sawsan Malik*[c]

[a]Effat University, Saudi Arabia
[b]Bucharest University of Economic Studies, Romania
[c]Arab Open University, Kuwait
[d]Prince Sattam bin Abdulaziz University, Saudi Arabia

Abstract

Digital transformation (DT) has become a top priority for higher education (HE), driven by technological advances such as artificial intelligence (AI), artificial general intelligence (AGI) and Generative Open AI. It serves as a catalyst for the reshaping of mainstream processes in academic institutions, emphasizing teamwork, collaborative projects and critical thinking in research, learning and assessment strategies. In this chapter, the authors contextualize the use of this DT, highlighting its potential to improve learning experiences, business efficiency and upskill students and faculty. The holistic approach to DT as an enabler of excellence in HE is based on four pillars of excellence and impact: Business process reengineering, learning excellence and skill building, research capacity and innovation and partnership and outlook. DT needs the development of efficient, resilient, flexible and adaptable strategies and a strong collaboration between all the actors involved in the process to ensure the coherence, the sustainability and alignment of the objectives, means and targets with the real needs of the learners, tutors, labor market and society as whole. The authors' bold proposition consists of a model for the strategy design of DT in universities and colleges organized in three dimensions: understand, strategize, deploy

Digital Transformation in Higher Education, Part A, 1–22

doi:10.1108/978-1-83549-480-620241001

and exploit. Each dimension emphasizes different stages of the process: understanding emerging technologies and their impact on HE, collaboration between stakeholders, strategy and priorities formulation, roadmap of implementation, deployment and exploitation of digital technologies, etc. The ongoing DT in HE will continue to create an extensive shift in educational processes – learning, teaching, research and management. Institutions around the world are taking bold initiatives to adapt to this rapidly changing environment, emphasizing the importance of readiness for technological changes, system development, inclusive and sustainable transformation.

Keywords: Artificial Intelligence; digital transformation; higher education; active learning; challenges and risks; future jobs

1. Introduction

The quest of DT in HE is a new top priority for academic institutions worldwide. The recent evolution of technologies such as AI, AGI and generative open AI, just proved that universities and colleges around the world are really unready for the strategic deployment of DT toward improved learning experience, enhanced business efficiency performance and robust upskilling of students and faculty. The capabilities of technologies such as Metaverse, Cloud Computing, Open Source Software and Learning Analytics, challenge not only the administrate wing of HE but also generate unforeseen opportunities for learning, teaching and research excellence.

In this introductory chapter, we provide a context for the utilization of the DT in HE.

In Fig. 1.1, we summarize our basic proposition for the DT as a holistic enabler of excellence in HE. Our basic proposition is that the DT strategy in

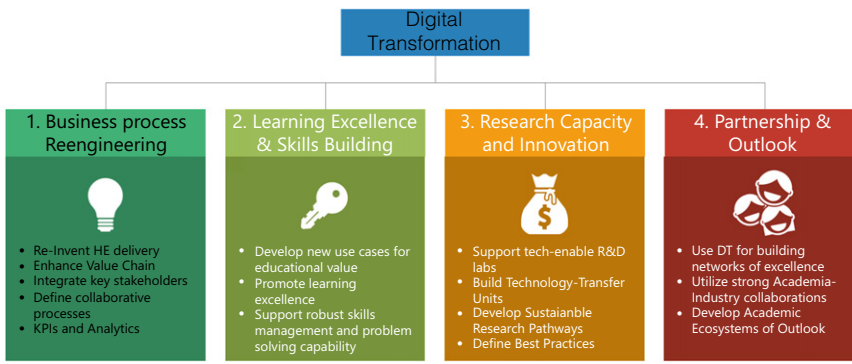

Fig. 1.1. Digital Transformation as a Holistic Enabler of Excellence in Higher Education. *Source:* The authors.

universities and colleges has to promote in parallel four pillars of excellence and impact:

Business Process Reengineering: The detailed focus of the mainstream business processes in academic institutions, including delivery of training, curricula and programs, staffing, financial efficiency, innovation, sustainable impact, industry partnerships and knowledge creation, will result to the need for a resilient business process reengineering. DT will serve this milestone not as a panacea or a magic solution to well-known problems but rather as a catalyst of a new generation in static, slow moving HE. Consider the example of the recent arrival of open AI models, including ChatGPT, Claude, Gemini and others, or focus AI application for research utilization like Sci-space or Elicit. Academic institutions have to reconsider all the well-known practices of assessment, evaluation and reward. Teamwork, collaborative projects, critical thinking and skill building must be set on the top of priorities in the strategy of assessment.

Learning Excellence and Skill Building: The strategic deployment of DT for the evolution of learning excellence and skill building in HE is another bold priority. Understanding the potential value of new technologies, tools and applications has to result to a well-defined roadmap for the design and implementation of use cases capable of promoting the learning experience and skill development. For sure in the same context, it is critical to elevate also the readiness of the faculty to support such a strategy shift and also to secure the required resources both in times of financial support and time allowance.

Research Capacity and Innovation: In the last year, an amazing stream of new tools and AI-enabled applications appeared with the capability to elevate the research and innovation capacity in HE and the surrounding research and innovation ecosystem. To this direction, significant investments will be required to the deployment of AI hardware and software, GPUs, Large Language Models (LLM), knowledge elicitation tools and also training. In our opinion, academic institutions must be faster in the design and implementation of training programs to support this new change and also to offer research programs, e.g. PhD degrees and modules to support this priority. In parallel, academia has to move far away from static, time-consuming and even boring processes that limit the creative capability of young students into rigid static programs with limited connection to the needs of our world.

Partnership and Outlook: The DT strategy can also be seen as an enabler of a resilient partnership and increased outlook opportunity and vehicle for academic institutions. In simple words, new tech-enabled services can strengthen the partnership of universities, with industries, start-up firms, AI leaders and metaverse providers, allowing them to be part of an extended ecosystem that mobilizes resources and adds value to the real economy by addressing also critical social challenges.

In Fig. 1.1, above, we also indicated some strategic priorities for each of the pillars of DT strategy. These are indicative and not exhaustive, providing a clear direction for the desired outcomes for the utilization of DT strategy. In the next few paragraphs, we elaborate further:

Business Process Reengineering

- Re-Invent Higher Education Value Delivery: DT can be a real disruptor of value delivery in HE differentiating the time, place, mode and packaging of training, program and degree delivery. We are really confident that very shorty there will be a critical reconsideration of what is an academic degree, how skills and competencies are built in academia and how academia serves society and economy by utilizing the talent. It seems that a brand-new generation of modes will arrive due to DT deployment.
- Enhance Value Chain: In the same context, DT can enhance the value chain of HE by shortening time in bureaucratic procedures, setting contexts for creativity, research innovation and by allowing people to develop professionally by utilizing trusted knowledge and best practices.
- Integrate Key Stakeholders: The DT strategy can also set bridges between HE institutions and other stakeholders, including information technology vendors, industry associations, business hubs, government offices, think tanks and regulation bodies, in order to jointly develop the next generation ecosystem of value delivery with emphasis on knowledge creation, skill building and innovation.
- Define Collaborative Processes: DT has also the capacity to implement collaborative spaces and shared processes with emphasis on knowledge utilization, research design and impact transfer.
- KPIs and Analytics: It is also critical the DT strategy to be accompanied by a complete and integrated set of KPIs, analytics and dashboard so that a systematic performance monitoring can be delivered. This will help academic institutions to understand the impact of strategic initiatives powered by DT.

Learning Excellence and Skill Building

- Develop New Use Cases for Educational Value: A critical bet for the universities and colleges in the DT and AI times is to understand the new learning requirements of diverse communities of learners and to provide to them personalized experiences and use cases. In this direction, customization and personalization is critical. The AI has amazing capabilities and can promote this vision.
- Promote Learning Excellence: Learning excellence is an integrated, accumulated outcome of diverse factors and enablers. Enhancing quality of content, learning scenarios, quality of learning context, quality of educational resources, high competent faculty and academic administration can be seen as gears of DT efficiency.
- Support Robust Skill Management and Problem-Solving Capability: The DT strategy has to provide new meaningful ways for skill building and for problem-solving capability enhancement. Applications related to AI embodiment in the learning practice in HE, Metaverse learning applications and cloud-based large language models for learning will provide support in this area. It is also evident the LLM will empower learning services in a more sophisticated manner than in the current thread of development.

Research Capacity and Innovation

- Support Tech-Enabled Research and Development (R&D) labs: The DT evolution in HE has also to take to another level the R&D labs. Significant investments on technology-enabled R&D capability will be required. This kind of infrastructure will enable a boost on R&D capability of individual, teams and institutions. Universities and colleges should update their R&D strategy. The ecosystem of research grants and projects in parallel with the evolution of doctoral schools and partnership with industry and business world have to be integrated and strengthened.
- Build Technology-Transfer Units: The academic institutions must deploy an aggressive policy and strategy in terms of technology and knowledge transfer units. New knowledge, innovations in technologies, robust new methodologies in business and management should be fast transformed to value through commercialization or social impact.
- Develop Sustainable Research Pathways: Scaling up research impact and innovation transfer has also to be considered a developmental process through sustainable research pathways. The human capital and the research talent need to be elevated with well-designed sustainable research paths, within and across institutions.
- Define Best Practices: The utilization of the DT for research excellence and innovation needs also a systematic effort on the codification, reuse and adoption of best practices. For this purpose, setting benchmarking and deploying benchmarking at the international level has to be considered bold priority.

Partnership and Outlook

- Use DT for Building Networks of Excellence: The academic institutions, needs also to deploy all the means provided by the DT Strategy in order to design, implement and exploit networks of excellence in all the aspects of the value chain. The previous generation with numerous memorandums of understanding (MoUs) and agreements between institutions must be now promoted by new channels and new processes to multiply the effect of integration.
- Utilize Strong Academia–Industry Collaborations: This can be realized through joint developmental programs, internships and shared projects for knowledge and know-how transfer.
- Develop Academic Ecosystems of Outlook: Universities and colleges, should also lead the changes and the innovations in the business, government and sustainability environment. For this purpose, academic-driven ecosystem of shared value must be designed including think tanks, innovation unities, startup ecosystems, venture capitals and other complementary initiatives that can gear up the positive foot print on economy, society, culture and wellbeing.

Having in mind this basic spectrum of a holistic consideration of DT in HE, in Fig. 1.2, below, we propose a model for the strategy design of DT in universities and colleges organized in three pillars, namely Understand, strategize, deploy and exploit. Each of these pillars synergistically contribute to the implementation of a resilient DT strategy in universities and colleges. In the next paragraphs, we provide some further insights into the determinants of these pillars.

The first pillar of our model is related to the thorough understanding of the emerging technologies and their capacity to support, enable and elevate the new vision for the impact of the HE in society, economy and business. This means that diverse stakeholders, roles and responsibilities have to interact with the technologies and with meaningful use cases that conceptualize the potential impact of DT in diverse functions of HE. This also implies an integral discussion and partnerships with technology and service providers for a direct translation of technological capabilities to the academic context.

The second pillar is related to the strategy formulation for the DT in universities and colleges. This high-level strategy is not a document without impact on the daily processes and the orchestration of individual and team contribution to the vision. It is related to a systematic effort in the co-design of strategy, strategic priorities and roadmaps for the implementation. It is also about promoting specific initiatives of DT that communicate the added value and promote effectiveness and efficiency. For the effective implementation of the strategy, universities need also to develop awareness campaigns and to build capacity through training, skill building and knowledge transfer.

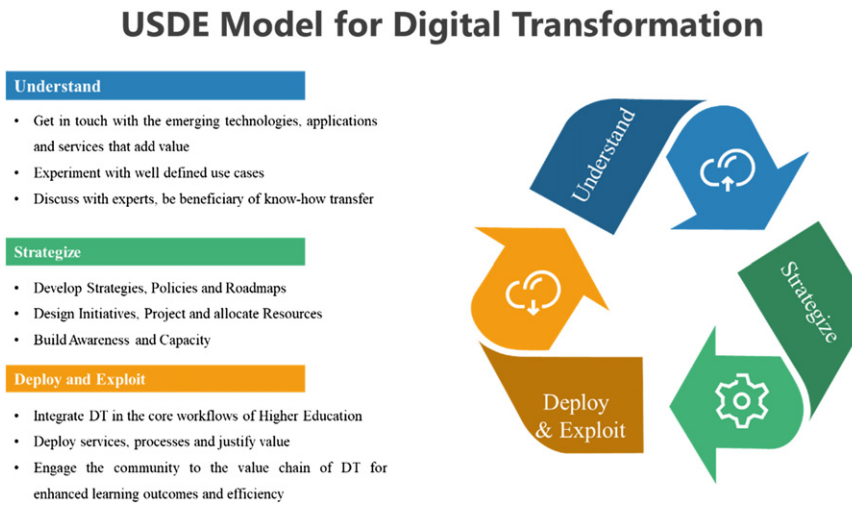

Fig. 1.2. The Understand–Strategize–Deploy–Exploit Model for the Strategic Adoption of DT in Higher Education. *Source:* The Authors.

Last but not least, the deployment and the exploitation of the added value of DT have to be promoted through the engagement of the diverse communities, roles and responsibilities in well-defined services attached to the core and the novel processes in HE institutions.

The following is an indicative least of subtasks integrated in the three pillars of the USDE model for DT in HE.

Understand

- Get in touch with the emerging technologies, applications and services that add value,
- Experiment with well-defined use cases,
- Discuss with experts, define beneficiaries of know-how transfer,
- Elaborate in terms of challenges and opportunities,
- Develop competence maps and identify knowledge gaps,
- Design champion teams and mentors and
- Involve task forces and collect research-based evidence.

Strategize

- Develop strategies, policies and roadmaps,
- Design initiatives, project and allocate resources,
- Build awareness and capacity,
- Secure sufficient financial resources and human capital,
- Allocate roles and responsibilities in the execution of the DT Strategy,
- Vision the contribution of the implementation in the overall performance,
- Develop managerial frameworks for monitoring of success and
- Define KPIs and analytics for the effective implementation.

Deploy and Exploit

- Integrate DT in the core workflows of HE value chain,
- Deploy services, processes and justify value,
- Engage the community to the value chain of DT for enhanced learning outcomes and efficiency,
- Develop robust learning programs,
- Enhance the student experience with DT initiatives,
- Design faculty professional development programs,
- Implement benchmarking and best practices teams and
- Document best practices and lessons learned knowledge repositories.

2. Bold Digital Transformation Initiatives in Higher Education

The HE landscape is undergoing a significant transformation and disruption driven by the advent and integration of innovative digital technologies. This DT phenomenon represents a major shift in how educational services will be delivered

and managed (Diwaker et al., 2021). DT in HE is a strategic reorientation toward a more interconnected, flexible and student-centered HE in the future (Bisen et al., 2021). Many institutions around the world have embarked on bold efforts in this regard. The future outlook and continuous evolution in the DT HEIs necessitate a focused and dynamic approach (Fig. 1.3), encompassing the readiness for ongoing technological changes, the development of agile and resilient systems and the commitment to sustainable and inclusive transformation.

Immersive learning through virtual and augmented reality. HEIs will be increasingly using immersive VR and AR technologies to create immersive educational experiences for students. These advanced technologies could benefit hands-on learning and vocational training, where real-world skill application is crucial. More importantly, AR and VR technologies are specifically effective in scientific fields such as medicine, engineering or archeology, where students can be more actively involved with complex concepts. AR and VR technologies enhance students' learning and engagement (Gandolfi et al., 2018), knowledge retention and skill acquisition across different domains in HE and enhance professional training and lifelong learning (Paskova, 2022). These technologies enhance students' collaboration, critical thinking skills and active learning by providing simulations of real-life experiences through interactive environments (Algerafi et al., 2023; Lai & Cheong, 2022).

Personalized Education through AI and Machine Learning (ML). AI algorithms through learner profiling techniques and learning data analytics have been implemented to ensure personalized learning experiences tailored to individual students' needs (Montebello, 2021). The future will likely see an increased emphasis on personalized learning facilitated by AI and data analytics. These technologies can tailor educational content to individual student needs, learning styles and career goals, making learning more efficient and effective. This approach improves student engagement and their preparedness for future careers. One example is adaptive learning platforms, which adjust pace and style according to individual learners' preferences. Other AI-based tutoring systems provide tailored assistance (Omar Jian, 2023). AI and ML can recommend appropriate content and curriculum and support students' performance

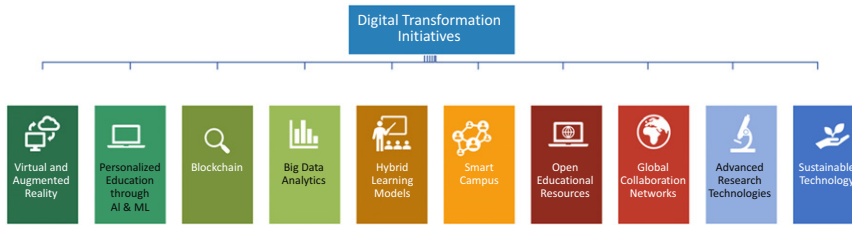

Fig. 1.3. Bold Digital Transformation in Higher Education Initiatives. *Source:* The Authors.