Section 3

Wholistic Transformations in Higher Education: Bridging AI and Contemplative Approaches

Chapter 7

Dimensional Approach for a Digital Transformation Process in Higher Education

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Introduction

Technology has evolved over the last few decades and the development of new technologies are growing at an alarming rate. Digital transformation activities are prominent (critical) to ensure that all business sectors incorporate and integrate new technologies to ensure viable business modules. Our business sector with digital transformation, which includes AI (Artificial Intelligence) adoption, is vital and ready to be integrated with the educational sector. This integration is not optional but vital for the survival and thriving of IHEs (institutions of higher education).

The research focus of this chapter is on HE (higher education) sectors, and more specifically universities. This research proposes a multi-dimensional approach to enhance the digital maturity of a university to be at the forefront of technology development and integration. The research utilises a systemic literature review to identify critical contributions to digital transformation (dimensions) within the HE sector.

The integration of digital elements into HE impacts all role-players within IHEs, from the student and educator to the ICT (information and communication technology) department and management. AI integration should be a wholistic approach with the buy-in from all custodians (role players) to ensure all aspects are aligned to the vision and mission of the institution.

The research has identified three dimensions that have a direct impact on a university's digital transformation maturity namely custodians, processes, and AI drivers. In a technology impacted educational environment, technology has become a driver to reshape HE around the world. Educational spaces are being transformed and morphed into a hybrid collaboration between humans and technology. This transformation speaks to the changes from traditional educational pedagogies to technology based educational pedagogies (Okagbue, Ezeachikulo, Akintunde, Tsakuwa, Ilokanulo, Obiasoanya, Ilodibe, & Ouattara 2023). There is a global drive towards the 4IR (fourth industrial revolution) and 21st-century learning skills. With global digital drivers, quality education needs to adopt new technologies brought in by digital transformation (Shenkoya & Kim 2023).

The goal of this chapter is to create a narrative of existing and published concepts and frameworks, and the underpinning that contributes to understanding the digital transformation as well as AI within IHEs. The first part of the research consists of a systemic literature review of published information on digital transformation and AI in HE that concludes with key factors and drivers from both the digital transformation and AI spheres. The second part of this research utilises the factors and drivers to propose a step-oriented approach to AI integration that can assist IHEs to increase their digital transformation maturity levels.

One of the most recent impact drivers is AI and it has the potential to transform HE through digital transformation (Spada, Chiarello, Barandoni, Ruggi, Martini, & Fantoni 2022; Mukul & Büyüközkan 2023; Pereira, Falcão, Costa, Lunn, Pêgo, & Costa 2023). Digital transformation through AI should be integrated into all levels of education focusing on strategic and institutional pedagogies, platforms, and implementation strategies. Digital

transformation can be described as the integration of digital technology (in this research, AI) into an educational space (HE) that will change the operational drivers to add value, quality, and support to students. AI integration impacts not only the activity driven aspects, for example teaching and learning, but extents into management aspects, for example policies, to behaviour aspects including plagiarism and academic writing. AI can be regarded as both a disruptor and an enabler. Both viewpoints (disruptor and enabler) should be taken into account when IHEs plan, design, implement, and monitor transformation activities that link to AI. The combination of both will provide a stage approach to ensure that AI integration is managed to the desired outcome of an IHE. This research will investigate which drivers (both disruptors and enablers) must be in place to address AI within a digital transformation process in HE. The focus of the research is on a multi-dimensional approach that will include 1) AI drivers; 2) custodians; and 3) process phases to ensure the integration of AI into the HE space.

Digital Transformation in Education

Digital transformation is based on technology (usually new technology) and the blending of technology with people towards a specific outcome (Zarifis & Efthymiou 2022). According to Alenezi (2021:1 of 13), digital integration speaks to the 'evolutionary process' that impacts and involves both people and organisations. Alenezi (2021:10 of 13) adds that digital transformation in HE speaks to adapting and updating current methods and practices to address the HE mission.

According to Zarifis and Ethymiou (2022:1868), focusing on AI and digital transformation is key when universities create and implement their own plan of action (a 'roadmap'). Fernández, Gómez, Binjaku, and Meçe (2023:12351) state that IHEs are adopting new digital models to become digital universities. Digital transformation (especially focusing on AI integration) is no longer a luxury within the HE space, but rather a necessity to ensure continuation that includes income, student participation, and service delivery. AI is transforming education landscapes and impacts teaching and learning

through digital transformation and competences focusing on 21st-century learning skills (Kuka, Hörmann, & Sabitzer 2022). Kuka *et al.* (2022:551) are referring to a few emerging subject areas in AI transformation that are impacting HE. These emerging areas include VR (virtual reality), AR (augmented reality), virtual laboratories, and AI for student assessment. It is critical to note that AI can be regarded as the underpinning factor of digital transformation. AI driven technology is mainly linked to digital development due to the large data volumes created by digital transformation which acts as the contributing factor to AI being a critical aspect to take note of (Aldoseri, Al-Khalifa, & Hamouda 2024).

Integrating AI into education is a global challenge in terms of educational elements to meet instructional and learning needs of students (Xu & Ouyang 2022). This is supported by Zawacki-Richter, Victoria, Bond, and Gouverneur (2019:1) who identify AI in education as an emerging field in educational technology in HE. The combination of new and existing technologies within digital transformation is critical. Incorporating old technologies with new technologies (for example, AI) is vital to the digital transformation process (Zarifis & Efthymiou 2022).

HE spaces, specifically university spaces, have a different path to digital transformation than industries. Universities have a different relationship with their students than industries have with customers (Zarifis & Efthymiou 2022). One of the most important tasks of universities is to ensure student-centred learning (Yuliana 2022). Part of student-centred learning includes teaching methods, student service delivery, and technology stable environments created through digital transformation. A pedagogical change in digital transformation is occurring due to the morphing of a pedagogical shift from educator-led teaching and learning towards student-centred methods (Øvrelid, Bygstad, Ludvigsen, & Dæhlen 2023). This shift towards incorporating technology in teaching and learning has a direct impact on any university's infrastructure, culture, and digital competencies (Pinheiro, Tømte, Barman, Degn, & Geschwind 2023). The impact of digital transformation is not only focused on teaching and learning but ripples through the management, ICT, and service

providing infrastructure of any IHE. One aspect that is critical within the HE space is knowledge generation that contributions to a wide range of bodies of knowledge. IHEs should always strive to protect the integrity, validity, availability, and accuracy of these new aspects, for example plagiarism. Using AI software incorrectly can become a knowledge risk and can harm the reputation of any educational institution.

All universities must have a real and clear vision of how to digitally transform a university (Fernández et al. 2023), especially focusing on AI integration. This transformation must align with student needs in the given HE space. The alignment of the digital transformation vision is the responsibility of leaders within the university. Ultimately the university must strive for digital maturity (Fernández et al. 2023). For digital maturity, leadership is a key aspect of the success of digital transformation (Schatsky & Gurumurthy 2019). The leaders of digital transformation in universities may differ from those in industries, just like these leaders may vary from academics (university faculty) to business consultants and technology experts with the same vision and driving force for the university (Zarifis & Efthymiou 2022).

A critical aspect to note is that digital transformation does not only include a top-down (management) approach but also a bottom-up approach, both of which are equally important (Øvrelid et al. 2023). A bottom-up approach addresses all role-players and different levels within the university – examples include ICT personnel, academic, and support staff. It is therefore critical to obtain buy-in from all role-players within an IHE. Digital transformation is not only about digitising education platforms (Díaz-García, Montero-Navarro, Rodríguez-Sánchez, & Gallego-Losada 2022) but should include all stakeholders, management structures, and policies that lead to an organisational and cultural change. Digital transformation is based on three categories: Technology, process, and people (Zarifis & Efthymiou 2022; Lakshmi, Kumar, Kumar, Patel, Lokesh Naik, & Ramesh 2023). Gkrimpizi, Peristeras, and Magnisalis (2023:15) expand on these three categories and include environmental, strategic, organisational, technological, people-related, and cultural aspects.

In the past, digitalisation (including AI) originated from computer science and engineering but now covers a multiple of disciplines including philosophy, cognitive science, neuroscience, economy, and more (Zawacki-Richter et al. 2019). One pedagogical environment where digital landscapes have a significant and disruptive impact is the education landscape. Digital transformation within education links directly to the foundational aspects of how educational methods are designed and implemented for students. According to Bisri and Putri (2023:169), reasons for implementing digital transformation include accessibility by society, increased business profit and customer satisfaction, a growing organisation performance, productive efficiency and quality of education, and improving the student experience.

It is therefore important that within any educational environment, digital transformation must be regarded as a multiple disciplinary and dimensional activity that includes all aspects of HE. The transformation to a digital AI space is critical to be competitive with other IHEs across the globe. The next two sections (3 and 4) will provide a brief overview of digital transformation and the critical focus of AI within digital transformation.

Educational Based Digital Transformation Frameworks

This section investigates factors and indicators that address digital transformation within the educational environment. Table 7.1 depicts factors relating to digital transformation in education within three published frameworks that include the Microsoft Education Transformation Framework for HE (Microsoft 2024), Google, KPMG (Klynveld, Peat, Marwick, and Goerdeler) framework (KPMG 2020). and the Deloitte viewpoint to digital maturity. The terms in BOLD in Table 7.1 depicts the main categories within the motioned documents and the rest, subcategories relating to digital transformation.

Table 7.1: Industry oriented frameworks for digital transformation

Microsoft	Google	KPMG	Deloitte
Leadership	Vision	Critical capabilities	Flexible, secure infrastructure
Vision	Learning	Insight driven	Cloud infrastructure
Inclusion	Culture	Innovative products	Agile DevOps (development operations)
Accessibility	Funding and sustainability	Innovative services	Technology platforms
Partnership	Professional development	Experience centricity by design	Security (cyber)
Capacity building	Technology	-	Data mastery
Strategic Planning	Community	Integrated partners	Data analytics
Immersive experience	-	Responsive supply chain	Digitally savvy, open talent networks
Teaching & Learning	-	Responsive operations	Training/Digital competencies
Educator development	-	Seamless interactions	Talent identifying
Personalised learning	-	Aligned workforce	Ecosystem engagement
Wellbeing	-	Technology blueprint	External partners
Quality assurance	-	Actors	Intelligent workflow
Curriculum	-	Access	Recalibrating process (human/technical)
Assessment	-	Interaction hubs	Unified customer experience
Technology Blueprint	-	Organisational capabilities	Business model adaptability
Operation management	-	Process	New models to meet needs

Microsoft	Google	KPMG	Deloitte
IT (information technology) management	-	Changed advances	-
Collaborative learning	-	Cyber security and privacy	-
Data driven	-	IoT (internet of things)	-
Devices for learners	-	Enterprise data store	-
Intelligent environment	-	Middle and front business practices	-
Purpose driven access	-	Data analytics	-
Sustainability design	-	Digital technologies and process advances	-
Facilities management	-	Enterprise support	-
-	-	Enterprise technology	-
-	-	Enterprise	-
-	-	Customers	-
-	-	Communication	-
-	-	Strategy	-
-	-	Core business practices	-
-	-	Advanced data and analytics	-
-	-	Enabling business practices	-

According to Quy, Thanh, Chehri, Linh, and Tuan (2023:5), the main focus of digital transformation in organisations is to improve research, to increase competitiveness and scalability, to improve service experience, to increase productivity, and to increase revenue. According to Díaz-Garcia, Montero-Navarro, Rodríguez-Sánchez, and Gallego-Losada (2023:2), factors impacting digital transformation include the learning process,

internal communication, culture, data driven decision making, leadership, and people management.

Artificial Intelligence

AI has had an impact on many sectors across the globe, for example smart machines, industrial automation, agriculture, healthcare, transportation, ecosystems, warfare, business, and education (Hossain 2023). A wide range of digital tools and technologies have been developed according to the needs of students within the educational system (Alenezi 2021). According to Shenkoya and Kim (2023:11), digital transformation should enhance the concepts of E4.0 (Education 4.0). E4.0 is directly linked to the 4IR which is highly impacted by digital transformation (Quy et al. 2023). One subset of digital transformation that has a huge impact on education is AI (Quy et al. 2023; Shenkoya & Kim 2023). AI has been impacting on the education field and is changing the nature of educational instruction (Zhang & Aslan 2021; Zhang, Schießl, Plößl, Hofmann, & Gläser-Zikuda 2023). With the rapid development of AI tools and processes, AI is affecting not only how we teach but the whole educational process at large. According to Dokthaisong and Pinyonatthagarn (2021:11004), it is critical to address human capital development when dealing with AI.

The integration of AI with IHEs should be on both technical and human-related platforms. Most of the AI impact underpins and impacts almost all factors of digital transformation. It is therefore vital that when an IHE adopts a vision of digital transformation, the impact of AI must be understood. There are also a wide range of challenges with AI and digital transformation in education. According to Zhang and Aslan (2021:7 of 11), some challenges include cost, scalability, ethics, privacy, a lack of AI expertise, a lack of AI guidelines of a legal basis, changing thinking and management capacity, IT, infrastructure, skills, and access of the capability of IT (Quy et al. 2023).

The growing impact of AI is a catalyst for worsening digital poverty, outpacing national regulatory adaptation, the use of content without consent, and unexplainable models used to generate outputs (UNESCO 2023). UNESCO (United Nations

Educational, Scientific, and Cultural Organisation) continues and states that AI generated content is polluting the internet that leads to a lack of understanding of the real world as well as reducing the diversity of opinion, generating deeper deepfakes. AI adoption is no longer a 'futurist idea' but rather an inevitable reality with far-fetched implications for all technology users. A critical aspect to take note of is that AI is every changing, adapting, and re-transforming element to be in a continued state of flux. The technological growth of the 4IR has made inroads into IHEs, forcing them to deal with the digital transformation in all of its dimensions (Alenezi 2023). The 5IR (fifth industrial revolution) encompasses the notion of harmonious human-machine collaborations, with a specific focus on the wellbeing of the multiple stakeholders (Nobel et al. 2022). The goal of the 5IR is to address the inconsistencies discerned in the foregoing 4IR.

The 5IR has brought in an era of technological advancements, transforming various sectors tremendously, including education, and has brought with it a transformative shift to education in general with an emphasis on digitalisation, AI, automation, and the IoT. The 5IR is characterised by a synergistic integration of humans and technology (Moola et al. 2024). There is a renewed focus on the role of humans in an era of rapid technological innovation.

Curriculum 5.0 is a state-of-the-art curriculum that matches the demand of future jobs and the 5IR environment. Barrot (2023) explains the context of curriculum 5.0 and why there is a need to adopt such a curriculum innovation, as well as comprehensively discusses the principles and key features of curriculum 5.0. The 5IR can make our students ready for the future and is an opportunity to make HE more relevant.

The COVID-19 (Coronavirus disease of 2019) pandemic has had a significant impact on IHEs worldwide, accelerating the use of digital tools in education (Rampersad, Maynard do Lago, & Fernandes 2024). In fact, it is being said that COVID-19 has been observed as 5IR, which has naturally advanced education five/10 years ahead of digitalisation (Makumane, Khoza, & Zuma 2022). The article is situated in the 4IR to adopt the policies and

procedures to guide IHEs in the present – this can be the short-term plan of action with a focus on the 5IR as a long-term plan for positioning IHEs to be relevant and value adding in the future.

Research Method

This research follows a quantitative approach by means of a systematic literature review based on the PRISMA (preferred reporting items for systematic reviews and meta-analyses). The PRISMA approach assists research to analyse published research (Page, McKenzie, Bossuyt, Boutron, Hoffmann, Mulrow, Shamseer, Tetzlaff, Akl, Brennan, Chou, Glanville, Grimshaw, Hróbjartsson, Lalu, Li, Loder, Mayo-Wilson, McDonald?, McGuinness, Stewart, Thomas Tricco, Welch, Whiting, & Moher 2021).

The research focused on 2022 and 2023 and used the ScienceDirect Database with a focus on research (review) articles in journals within the ScienceDirect Database. The literature search included the following keywords: ('higher education') AND (AI OR 'artificial intelligence' OR 'machine learning') AND ('digital transformation') AND/OR ('driver' OR 'factor' OR 'indicator'). The preliminary result indicated 189 relevant articles. From the 189 articles, 50 were identified to be included in the analysis that focuses on either digital transformation or AI within HE. The article focused on a systematic approach but with the aim to understand the articles used to identify needed concepts in the topic area. After the articles were selected, the research used Atlas.ti (a qualitative analysing software tool) to analyse the published articles. Atlas.ti was used within this research study to analyse the 50 articles obtained by the PRISMA approach. Figure 7.1 depicts keywords from the articles.

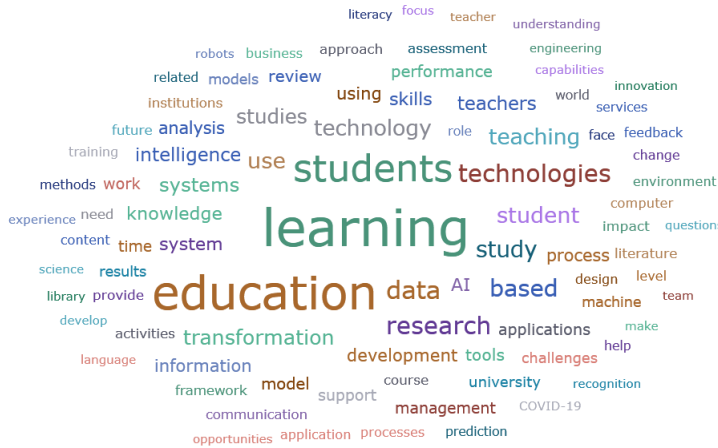

Figure 7.1: Keywords from literature review (Personal archive)

From the literature review, several AI drivers were identified as having a growing and critical impact on academic spaces. These include AI writing detection, formative course support, student risk analysis, virtual learning, personalised learning environment, integrated AI support, AR, real time feedback, data analysis, gamification, curriculum design, and automation. These examples of AI drivers are only a short list and can be extended (cf. Table 7.2). This research proposes a multidimensional framework where these AI drivers are linked to custodians and implementation processes to ensure a growing AI maturity over time.

Proposed Framework

The proposed framework combines a wide range of the digital transformation and AI factors and indicators that are needed to be integrated within an IHE. The framework proposes a multidimensional approach to incorporate AI into the existing learning environment.

The first dimension of the proposed framework includes the process phases which are 1) commit, 2) strategise, 3) test (and develop), 4) implement, and 5) evaluate. The second dimension reflects on the role players/custodians of the AI integration. The

custodians for this approach were derived from the literature review and include 1) leadership, 2) AI management, 3) technology department, 4) academics, and 5) students. The third dimension is the set of AI drivers that are required to ensure the AI maturity of a university. Note that students were added as part of the custodians of AI as students have a large role to play within the AI maturity of a university. Note the input of the students will differ from the other custodians.

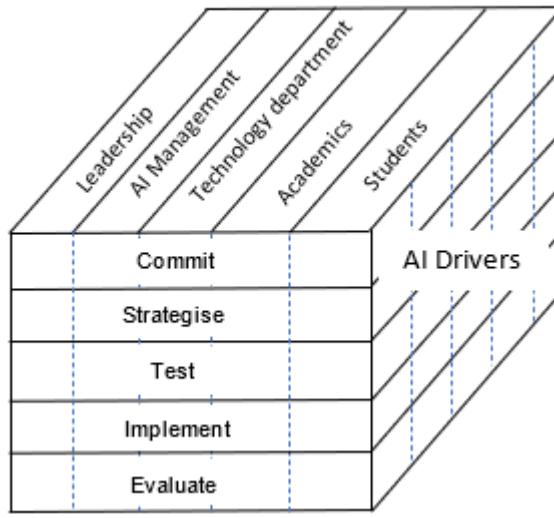

Figure 7.2: Proposed framework (Personal archive)

It is critical to note that the planning of the AI space within an educational area must have short-term goals (those that have to be implemented within a year or two) and long-term sustainable goals that will allow the educational space to grow with new technologies and developments in the future. This is where the adoption from the 4IR to the 5IR will be incorporated and implemented. Both approaches of short-term and long-term planning are to ensure a rigorous design, implementation, testing, and measuring phases including all relevant role-players (and custodians) within the IHE. One of the factors that will determine the success of the integration of AI into IHEs is the

buy-in and commitments from the different custodians. Only if all the custodians support this approach will the AI integration be success within the environment. However, this is important to note that one of the most difficult aspects of reinventing HE spaces is the human factor.

The systemic literature review identified the tasks (AI drivers) that are critical to be addressed by different custodians. AI drivers can be linked to a custodian as a point of reference. However, this research identified several AI drivers (not an exhaustive list) that are directly linked to all custodians as depicted in Table 7.2.

Table 7.2 provides the AI drivers that are linked to the custodians of AI integration within a university. Most (if not all) of the AI drivers will expand over all the process phase dimensions (which include the process phases 'commit,' 'strategise,' 'test,' 'implement,' and 'evaluate'). For each of these phases, the custodians should create and implement short-term and long-term plans to ensure that the university grows in AI maturity over time. Focusing on both a bottom-up and top-down approach (between different custodians) is critical to ensure that everyone within the university has a mindset of digital transformation.

A critical aspect of integrating AI (or any digital transformation approach) is transparency to all the relevant stakeholders. The IHE must have the needed digital transformation policies and procedures approved and available. This will ensure that students understand the 'rules and regulations' of what is acceptable during their studies and what will be a violation of the policies. The research proposes that all IHEs provide an MOOC (massive open online course) that is compulsory for all students to complete. Such a MOOC will explain the university's digital transformation policy and process as well as guide the student to what is acceptable in their studies and what activities are against the policies.

A similar proposal for an internal course for all faculty members is equally important to ensure that they (the role-players) understand the vision of the university and their

Table 7.2: Task for each layer in proposed framework

Leadership	Management	ICT	Academics	Students
Vision	Governance	Data analysis	Student support	Awareness
Alignment 4IR	Digital strategy for policies	Measurement instruments	Curriculum development	Compliance
Sustainability	AI readiness	New advances	Assessment	Participation
Community enrichment	Integrated teaching and learning plan	Transparency	Grading	-
Culture creation	Global/social change	Accountability (audit process)	Personal learning spaces	-
21st-century learning skills	External collaboration	Support process	Gamification	-
E4.0	Resources	Monitoring	Feedback	-
Long-term planning	Equity and inclusiveness	Professional development	Tutoring	-
-	National/ International standards	Security/privacy/ accessibility	-	-
-	Implementation planning	Academic student support	-	-
Ethics policies	Ethics policies	Ethics processes	Ethics teaching	Ethics participation
Wellbeing opportunity	Wellbeing opportunity	Wellbeing environment	Wellbeing participation	Wellbeing participation

Leadership	Management	ICT	Academics	Students
Culture building	Culture building	Culture infrastructure	Culture participation	Culture participation
Student-centredness	Student-centredness	Student-centredness	Student-centredness	-
QA (quality assurance)	QA	QA	QA	-

role and responsibility to assist the university in this digital transformation process.

Contribution

The contribution (in the form of a literature matrix and proposed framework) of this chapter is to propose a possible AI transformational process for IHEs. Atlas.ti was used as a qualitative data analysis method to obtain the coding structure, relationship links, and the network diagram to provide a clearer understanding of the interlinking of the AI transformational indicators. The hierarchy between the dimensions, custodians of AI, and AI drivers is mapped. This proposed mapping of the different dimensions will provide HE with a roadmap that can be used as a guide to incorporate AI correctly, ethically, and institutionally into their academic curricula and qualifications. The proposed contribution of the research will be in the form of a guideline that can be used by IHEs to assist with digital transformation, including AI. The research provides a starting point to assess the maturity of digital transformation that is directly linked to the digital student-centred culture of the university.

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1 No initials are provided for this author.