PERCEPTION OF UNIVERSITY 5.0: A SURVEY-BASED STUDY

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ABSTRACT

Unquestionably, the era of the digital revolution has already induced substantial alterations in the appeal of universities. As the COVID-19 pandemic nears its conclusion, clear signs of digitalization in universities are emerging globally. In light of this changing environment, higher education institutions must not only innovate their instructional methods but also adjust them to meet the requirements of the globalized market. Therefore, they need to reassess methods to enable access to lectures at any time and from any location. Higher education institutions must not only address the escalating digital demands of Generation Z but also prepare for the upcoming challenges posed by Generation Alpha. Consequently, a study survey was undertaken involving three distinct categories—undergraduate students, academics, and managers/employers—totaling 346 participants. A survey questionnaire was constructed around four primary inquiry principles, utilizing a mixed-methods approach to elucidate the eight specific hypotheses in this research. Outcomes indicated a substantial, linear correlation between the importance respondents attributed to digitalization and digital education. A notable, linear correlation was also identified between the significance attributed to digital education and higher education. Current student preferences and university initiatives indicate a positive predisposition toward a blended education approach. Moreover, a comparable perspective is anticipated regarding the future adoption of virtual education models post-2030. This paper predicts that higher education institutions will progressively provide hybrid education models in response to marketplace demands before 2030, achieving various levels of acceptance across several fields, including the medical, engineering, and social sciences. Post-2030, conventional universities will persist in employing hybrid education, while digital universities within the University 5.0 generation will undergo inevitable expansion.

Keywords: University 5.0, Digital Universities, Digital Era, Virtual Education, Hybrid Education.

INTRODUCTION

Universities have recently been compelled to provide educational programs using innovative methods to function within a global market. Consequently, they must reevaluate and restructure their methods of delivering universal course access. Universities must not only satisfy the escalating digital demands of Generation Z undergraduates but also prepare for the imminent influx of Generation Alpha. In response to such circumstances, most universities have augmented the implementation of online and hybrid educational models across all disciplines, driven by commercial demand, particularly throughout the COVID-19 pandemic.

From the Middle Ages, university structures as well as their principal stakeholders have continuously been scrutinized. Initially, the University 1.0 generation commenced as places for knowledge transfer during the 11th century. Subsequently, the 19th century marked the emergence of the University 2.0 era, which combined knowledge transfer with academic research. The 1970s introduced the University 3.0 era, characterized by institutions focused on knowledge transfer, research, and university-industry collaborations. Following this, University 4.0 emerged as a digitalized higher education institution characterized by social and technological advancements throughout the digital revolution of the 2000s. This study aims to outline a vision for the forthcoming fifth-generation University 5.0, expected to evolve during the 2030s. University 5.0 represents the digital university era, wherein institutions aim to serve the entire globe as a unified market, offering comprehensive educational programs in a translocal and transtemporal manner.

Several pioneering, prestigious higher education facilities and universities have initiated the digital university age. Numerous acclaimed innovations have emerged in worldwide headlines. Stanford University established digital class environments enhancing the old, existing distance learning framework (Hadhazy, 2021). Meta, previously known as Facebook, announced the establishment of ten virtual university campuses across the US (Greener, 2021). In Asia, the Communication University of China inaugurated a digital campus through a collaboration with XiRang, Baidu's metaverse platform (Qin, 2022). Similarly, the University of Miami announced its foray into the metaverse (Terr, 2022). The imminent adoption of University 5.0 is bolstered by the backing of prominent digital corporations (Gurieva et al., 2019).

Every one of these advances occurred within a brief timeframe, articulating novel parameters for the current landscape. It can be argued that institutions must increasingly adopt digital technologies and offer hybrid educational opportunities to their students in the near future. The perceptions and expectations of Generation Z students are consistent with this trend. Indeed, this transitional period can currently be characterized as the University 4.0 era. Subsequent generations, including Alpha and Beta, along with their inherent desire for digital transformation, are anticipated to fundamentally alter the university system post-2030, transitioning into University 5.0 or an era of entirely digital universities.

The COVID-19 pandemic undoubtedly functioned primarily as an impetus for higher education institutions globally to adopt digital education. However, the era of digital transformation will merely alter educational methodologies; the core curriculum and faculty members will remain pivotal in higher education, as evidenced from University 1.0 to University 4.0, while extending to the anticipated University 5.0 phase. Meanwhile, universities have actively formulated fresh approaches to reassess their objectives. Digital transformation empowers universities to engage proactively in worldwide academic ecosystems, enhancing their institutional visibility as well as international competence (Dhameria et al., 2025). Indeed, digital transformation has emerged as a pivotal element for educational advancement, as it encompasses the incorporation of disruptive technologies alongside the reorganization of processes and cultural adaptation, enabling universities to address societal alterations and labor market demands (Aquino et al., 2025). Increasing constraints in the economy and political circumstances have heightened scrutiny regarding the perceived value of a university degree, particularly in terms of cost, accessibility, and human resources preparedness (Alexander et al., 2019). Certainly, envisioning the next generation in higher education needs to profoundly account for the relentless innovations of the digital era.

This study presents a research survey assessing the perspectives of students pursuing formal undergraduate studies, academics, and managers/employers regarding the digital evolution of universities within Türkiye. This document is organized as follows. The subsequent section presents the literature review, followed by a delineation of the methodology. Next, the empirical findings are presented, and finally, the conclusion summarizes the paper.

LITERATURE REVIEW

Universities emerged as hubs of knowledge during the first generation of the Classical Period (University 1.0). Because of its organizational form, the University of Bologna, established in 1088, has historically been regarded as the progenitor of higher education institutions across Europe. The University of Paris, established around 1208, is recognized as a pioneer university comprising students and academics from several fields of study. Meanwhile, the Roman Catholic Church schools are regarded as the cradle of medieval universities. Their primary goals included research, scientific study, professional training, community development, and the teaching of critical thinking.

During the 19th and 20th centuries, European universities concentrated on research and science; as a result, their organization and ideologies shaped the concept of contemporary higher education institutions during the next generation (University 2.0). The founding of the University of Berlin in 1810, spearheaded by the academic reformer Wilhelm von Humboldt, has been broadly acknowledged as the beginning of the modern university concept; nevertheless, prior to 1789, Prussia and Hanover already possessed key elements of a research university identity (Anderson, 2004).

To foster both general learning and cultural knowledge, this approach integrated the arts and sciences with research. In fact, besides shaping the American model, several components of the Humboldtian method substantially influenced and ultimately led to the modern research university structure. American

higher education institutions were pioneers in adopting German instructional and scientific theories that were deemed efficient during the 20th century (Berman, 2012).

The Humboldtian model significantly influenced the university systems across Northern, Eastern, and Central Europe, in contrast to post-Revolutionary France's grandes écoles. Universities adhering to the Humboldtian paradigm empowered students to address complex problems, leading to substantial scientific advancements and considerable economic advantages (Geiger, 2004).

Simultaneously, the concept of the research university developed throughout the United States, where it was regarded as a public asset driving economic expansion and national goals. These types of universities are defined as institutions that prioritize research in their goals, often referred to as research-oriented or research-intensive. At the onset of the 21st century, they became central institutions in the knowledge-driven economy underpinning the worldwide information community (Mammadov & Aypay, 2020).

During the subsequent University 3.0 stage, scientists holding higher education degrees proved their immense value during World War I and World War II, prompting national governments globally to acknowledge higher education institutions as the principal centers for scientific research, technological advancement, humanities, and the social sciences (Powell et al., 2017). Simultaneously, universities were broadly regarded by nations globally as the primary source of instruction for prospective leaders. The aftermath of the war exhibited the advancement and emergence of strong university sectors in North America and Europe, accompanied by considerable growth in Latin America, China, Australasia, Russia, and select regions in Africa.

In the 1970s, advancements in biotechnology and intellectual property laws—notably the US Bayh-Dole Act of 1980—promoted market-oriented research and fostered collaborative partnerships between industry and higher education institutions to accelerate bringing innovations to the marketplace. According to the OECD, the same trend emerged across all developed countries. The emergence of this new concept—the "market university" acting as a financial catalyst—was most prominent across the United States and stood in stark contrast to Humboldtian ideals (Berman, 2011).

In the 1980s, technology transfer activities within universities gained prominence following the implementation of the US Bayh-Dole Act (Link & Scott, 2017). This legislation established a new perspective focused on licensing proceedings, which became a common, university-specific response (Nelson, 2001; Mowery & Sampat, 2004; Hall, 2004), as well as the establishment and operation of technology transfer units within universities (Solomon, 2014). Currently, research centers in higher education institutions are integral parts of the innovations at the national level framework in the United States, necessitating focused attention on these areas. These centers enhance information exchange among higher education institutions and partner enterprises, promote provincial economic growth, and augment competition in the marketplace (Link, 2002).

Medieval, or inaugural, universities were exclusively focused on science, aiming to produce essential professionals. While Humboldtian, or second-phase, higher education institutions continue to prepare individuals for particular jobs, they also cultivate scientists for research. Conversely, third-generation universities provide an environment conducive to achieving business-oriented goals.

Fourth-phase higher education institutions (University 4.0) improve human capital through instruction, education, research, and innovation. During this age of digital revolution, developing this type of higher education institution, with a special emphasis on a digitalized model, benefits the economy as a whole. Furthermore, investing in human capital development is a prudent and durable mechanism for fostering economic advancement (Mosteanu, 2021).

The contemporary university's purpose has been reinterpreted globally in relation to success in international competitiveness (Patomäki, 2019). Modern universities have adopted the University 4.0 paradigm, characterized by a digitalized framework (Akhmetshin et al., 2021). Consequently, Industry 4.0 impacts the requisite skills and competencies anticipated from personnel. Higher education institutions need to move toward the University 4.0 paradigm to continue producing competent human capital (Cubukcu & Akturk, 2020).

This topic concerns the latest developments and prospects for institutions aiming to achieve significant standings in national and global rankings, with a specific focus on digitization—the most pivotal

breakthrough in higher education since 2020. The identification of key factors affecting university evaluations by leading global and national rankings, the formulation of relevant models for creating a top-ranked university, the catalysts of digital shifts in academic institutions, and an examination of current trends and digitalization efforts at prominent higher education institutions are considered urgent subjects (Pavlov & Zashchitina, 2020).

The digital revolution represents a significant characteristic of this era. With advancements in Web 3.0, augmented reality (AR), virtual reality (VR), and blockchain technology, the metaverse has emerged as a post-reality realm—an ongoing, interactive multiplayer environment that integrates the real world with digital virtuality. Metaverse provides a solution to the fundamental constraints of internet-based 2D e-learning technologies in the context of e-learning (Mystakidis, 2022).

Presently, global software and computer technology corporations, including Microsoft and Meta, regard the metaverse as the next generation of the internet while investing significantly in this sector. For instance, Meta (formerly Facebook) acquired Oculus for $2 billion in 2014 (Solomon, 2014; Greener, 2021) and subsequently recruited a large number of developers to design its own metaverse initiatives (Reuters, 2021). While technologies for VR and AR are predominantly utilized within the entertainment and gaming sectors, a significant digital revolution is anticipated, particularly in the educational domain, with the advent of the new star metaverse (Egliston & Carter, 2020; Kraus et al., 2022).

Conversely, profound transformations within universities are being propelled not solely by technological advancements, but also by evolving societal shifts. As Generations Z and Alpha commence their undergraduate studies, their distinct learning needs require additional accommodations that diverge from those of preceding generations (Baumöl & Bockshecker, 2017). Consequently, Generation Alpha will join the labor market, comprising more than half of the workforce within the next ten years (Nagy & Kölcsey, 2017).

Following these four historical developments of university models, one may inquire, 'What ought to constitute the fundamental objective of higher education in the 21st century?' Consequently, it can be contended that any future outlook on higher education must substantially account for the overwhelming developments in the digital era.

The recent COVID-19 pandemic highlighted the importance of human interactions and societal relationships that university education facilitates through both physical and digital environments (Sabzalieva et al., 2021). In the post-2022 era, significant advancements in artificial intelligence (AI) technology have greatly influenced higher education (Polyportis & Pahos, 2025). The integration of AI has become a pivotal factor in the advancement of higher education institutions, establishing itself as a transformative force capable of facilitating an institutional shift toward 5.0 models (Hidalgo et al., 2025). Artificial intelligence will not supplant human intelligence; rather, it will augment it (Carayannis & Morawska, 2023). Meanwhile, an inexorable digital transformation in the higher education sector has persisted, rapidly altering learning environments for students and rendering traditional university settings and defined physical campuses progressively outdated (Gravett et al., 2025). The potential of digital learning appears auspicious, as emerging technologies are poised to further transform educational methodologies (Zou et al., 2025). Significantly, rapid advancements in AI, machine learning (ML), data science, business intelligence (BI), and business analytics (BA) have persistently revolutionized traditional educational, managerial, and business practices in higher education. This shifts institutions toward a digital paradigm at a time when information technology is poised to fundamentally alter the higher education landscape by 2040 (Zwaan, 2025). Notably, digital transformation in universities has progressed more rapidly than anticipated by sector players in recent years. Rapid contemporary advancements in digital technologies—encompassing AI, data analytics, ML, gamification, chatbots, digital literacy, robotics, assistive technologies, research data management, the Internet of Things (IoT), makerspaces, adaptive environments, mobile technology, 3D printing, VR, AR, and digital preservation—have revolutionized the current processes and facilities of higher education (Mitha & Omarsaib, 2025). The momentum of digitalization in higher education institutions has also initiated a significant revolution in the administrative procedures employed within the academic ecosystem (Kasmia & M'hamed, 2023). However, the efficacy of this approach ultimately depends on institutional preparedness, robust technological facilities, and the digital proficiency of academic staff (Nazyrova et al., 2025).

A digital university, characterized by its translocal and transtemporal nature, is perceived as an extension of the traditional university concept, realized through strong links across multiple regions and time periods. Consequently, digital links extend beyond the university campus and into global society (Sheail, 2018). Integrating the principles of Society 5.0 and Industry 5.0 into university operations and policies will enable both institutions and societies to maximize the advantages of digital transformation (Carayannis & Morawska-Jancelewicz, 2022). The digital university model perceives higher education as an evolving ecosystem that integrates organizational, technological, instructional, and cultural processes into a cohesive framework of continuous innovation and academic excellence, with the objective of enhancing the quality of education, capitalizing on the opportunities of the digital age, and ensuring the effective governance of instructional offerings (Zhukabayeva et al., 2025). Indeed, a digital university, specifically the University 5.0 model, may attract academic staff while delivering higher education worldwide, demonstrating both efficiency and effectiveness within the highly challenging international marketplace of the twenty-first century.

Consequently, the University 5.0 paradigm is positioned to flourish, driven by technological advancements and digital transformation. While conventional universities have experienced a period of prominence in the 2020s due to digitalization, the transition to entirely digital universities is imminent. In the coming era, the educational process is anticipated to transcend traditional limitations through features such as the real-time translation of course content and three-dimensional (3D) lectures. Furthermore, collaborative study groups alongside more tailored curricula may substantially enhance student participation in experiential learning.

This study expands upon existing research chronicling the evolution from University 1.0 to University 4.0 by introducing the concept of University 5.0. By analyzing its function as a fully integrated digital university in contemporary society, this paper offers an empirical viewpoint on prospective digital university frameworks.

MODEL AND METHODOLOGY

The 2020s are characterized by rapid digitization and boundless interactive connectivity. Digital innovations have already transformed the global economic system, making digital transformation ubiquitous. Higher education institutions are not exempt, and the velocity of this inevitable shift is poised to intensify. Furthermore, the higher education sector has swiftly transitioned into a novel stage where the proficient integration and utilization of digital tools are crucial for attracting students and faculty, fostering growth, facilitating remote delivery, and ensuring institutional sustainability. This shift is primarily driven by the expectations of Generations Z and Alpha. Ultimately, these advancements are projected to manifest as hybrid educational models combining formal and digital study in the coming years. Consequently, a survey questionnaire was developed based on the following factors:

Factor 1: Significance attributed to digitalization

Factor 2: Significance attributed to higher education

Factor 3: Generation Z's sensation concerning their behavior to digital innovations

Factor 4: Significance attributed to digital education

The research has identified "students pursuing formal undergraduate studies", "academics", and "managers/employers" as its population. A structured questionnaire comprising 42 items categorized within four areas like previously stated, and garnered responses from a sample of 346 individuals across 48 distinct cities in Turkey, including 106 students pursuing formal undergraduate studies, 83 academics, and 157 employers/managers. The research employed a 5-point Likert Scale with the objective of testing:

1st Hypothesis: A disparity exists among groups of gender concerning the significance of digitalization.

2nd Hypothesis: A disparity exists among groups of education concerning the significance of digitalization.

3rd Hypothesis: A disparity exists among groups of social conditions concerning the significance of digitalization.

4th Hypothesis: A disparity exists among gender groups concerning the significance of digital education.

5th Hypothesis: A disparity exists among groups of education concerning the significance of digital education.

6th Hypothesis: A disparity exists among groups of social conditions concerning the significance of digital education.

7th Hypothesis: A correlation exists between the significance of digital education and the significance of digitalization.

8th Hypothesis: A correlation exists between the significance of digital education and the significance of higher education.

EMPIRICAL RESULTS

IBM SPSS Statistics software was utilized to analyze the data. Based on the four identified factors, the results of the structured survey questionnaire are detailed below:

Table 1. Survey Questionnaire

Questions Regarding Digitalization	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree	Weighted Averages
1. The concept of digitization is a fundamental reality of the 2000s era	2.3	2	6.4	34.4	54.9	4.38
2. The concept of digitalization is integral to my everyday activities	1.2	1.7	6.1	40.8	50.3	4.37
3. The concept of digitalization pertains solely to technological issues	2.6	4.9	15.9	46.5	30.1	3.97
4. The concept of digitalization constitutes social as well as cultural trends	9.5	30.9	16.8	26.6	16.2	3.09
5. The concept of digitalization facilitates boundless interactivity in the affairs to communicate	2	8.4	13.6	48	28	3.92
6. The concept of digital transformation is going to alter conventional viewpoints	2	3.2	11	52.6	31.2	4.08
7. The concept of digitalization enhances the efficiency of our lives	2.3	3.8	18.2	43.4	32.4	4
8. I am presently utilizing digital technology extensively	1.2	3.5	12.7	47.4	35.3	4.12
9. The utilization of digital technologies has enhanced the comfort of my existence	1.2	4.3	11	46.8	36.7	4.14
10. The concept of digital performance enhances opportunities for work	4.3	11.3	22	35	27.5	3.7
				Significance Attributed to Digitalization	**TOTAL**	**3.97**
Questions Regarding Higher Education	**Strongly disagree**	**Somewhat disagree**	**Neither agree nor disagree**	**Somewhat agree**	**Strongly agree**	**Weighted Averages**
1. Technical advancements enhance the standards of university studies	1.2	7.8	14.2	46	30.9	3.98
2. Obtaining a bachelor's diploma is essential to my profession	1.7	6.4	11.8	38.7	41.3	4.12
3. Bachelor's studies will continue to be valuable and pertinent throughout one's life period	2.6	10.7	16.2	38.7	31.8	3.86
4. Bachelor's studies are congruent with the requirements and anticipations of professional career	7.5	20.2	24	29.8	18.5	3.32
5. The concept of digital influence significantly affects higher education institutions during this age	2	5.5	15.3	48.8	28.3	3.96
6. Higher education institutions ought to tailor effective educational techniques aligning with the reality from the digital era	1.2	4	10.4	46	38.4	4.16

7. The worth proposition for higher education institutions is transforming in the age of digitalization	0.9	5.2	17.9	48.3	27.7	3.97
8. Contemporary higher education institutions are compelled to provide education through innovative methods and function within worldwide market	1.7	6.9	15.3	49.1	26.9	3.92
9. Higher education institutions must meet the needs as well as ambitions of the emerging wave of undergraduates.	1.2	2.9	7.2	46	42.8	4.26
10. Higher education institutions ought to integrate conventional educational techniques together with the advantages of the digitalization era	1.4	3.2	8.7	44.2	42.5	4.23
				Significance Attributed to Higher Education	**TOTAL**	**3.98**
Questions Regarding Z (1995&2010) and Alpha (2010&2025) Generations	**Strongly disagree**	**Somewhat disagree**	**Neither agree nor disagree**	**Somewhat agree**	**Strongly agree**	**Weighted Averages**
1. Zs and Alphas exhibit greater susceptibility towards digitalization compared to their predecessors	1.4	3.5	8.1	35.3	51.7	4.32
2. Alphas exhibits a greater propensity for technology compared to Zs	2.6	8.4	19.1	32.7	37.3	3.94
3. Zs accept digitalization and technology as essential	0.9	3.8	9.8	39	46.5	4.27
4. Zs possess a distinct perspective concerning higher education	2	5.2	13.6	43.1	36.1	4.06
5. Zs proficiently utilize social media	1.7	3.8	10.1	37	47.4	4.25
6. Zs proficiently utilize digital communication technology	1.4	5.2	10.4	39	43.9	4.19
7. Zs are significant catalysts for the emergence of hybrid as well as digital approaches over universities	2	8.1	15.6	43.1	31.2	3.93
8. Zs appear to favor digital university studies	1.7	8.4	22.3	40.5	27.2	3.83
9. Zs appear to favor hybrid (formal/digital) university studies	2.6	5.8	18.2	48.3	25.1	3.88
10.Alphas' perspective and anticipations will shape the trajectory of higher education beyond 2030	2.6	4.3	20.2	41.3	31.5	3.95
				Generation Z's Sensation Concerning Their Behavior to Digital Innovations	**TOTAL**	**4.06**
Questions Regarding Hybrid and Digital Education	**Strongly disagree**	**Somewhat disagree**	**Neither agree nor disagree**	**Somewhat agree**	**Strongly agree**	**Weighted Averages**
1. Education in digital form transposes conventional educational environment setting into a virtual context	6.6	14.2	18.5	36.4	24.3	3.58
2. Notions of Web 3.0 advancement, Virtual Reality, Augmented Reality, Blockchain technology as well as current phenomenon Metaverse are going to revolutionize the current formal education classroom into a digital educational environment of the future	2.3	6.1	19.7	44.2	27.7	3.89
3. Hybrid university education will proliferate rapidly until 2030	2.9	4.9	17.1	46.5	28.6	3.93
4. A transition to an entirely digital format concerning university studies is on the agenda concerning post-2030	5.5	13.9	24.9	30.6	25.1	3.56
5. Digital studies will entirely supplant the existing conventional university education paradigm post-2030	5.5	15.9	23.4	33.8	21.4	3.5
6. Digital education serves as a useful adjunct for the conventional formal education approach in universities	2.3	4	13.9	50.3	29.5	4.01
7. Higher education institutions will be able to offer digital studies post-2030 exclusively in the discipline of social sciences	3.2	19.9	21.4	31.2	24.3	3.53

8. Higher education institutions will be able to offer hybrid education post-2030 in the discipline of social sciences	2.3	6.1	17.9	50.6	23.1	3.86
9. Higher education institutions will be able to offer digital education post-2030 exclusively in the disciplines of medicine and engineering	18.8	22.5	17.3	22.5	18.8	3
10. Higher education institutions will only be able to offer hybrid education post-2030 in the disciplines of medical and engineering	10.1	10.7	24.6	33.8	20.8	3.45
11. Post-2030, employers will seek certifications that demonstrate expertise over university degrees	5.8	15.9	23.4	34.4	20.5	3.48
12. Traditional formal education university paradigm will become obsolete post-2030	8.1	22	23.1	26.9	19.9	3.29
Significance Attributed to Digital Education					**TOTAL**	**3.58**

The 42-item survey questionnaire was adapted from established literature on digital transformation and generational behaviors to ensure construct validity. All items were pre-tested and aligned with the specific factors examined within the Turkish higher education context. Consequently, following data analysis using SPSS, parametric tests were employed given that the numerical data exhibited a normal distribution.

Table 2. Data from the Table of Cronbach's Alpha Test Performed to the Dataset

	Cronbach's Alpha	**Cronbach's Alpha based on standardized items**	**Number of items**
Performed for Entire Dataset	.832	.958	47
Digitalization Scale	.882	.897	10
Higher Education Scale	.894	.899	10
Z and Alpha Generations Scale	.913	.915	10
Hybrid and Digital Education Scale	.934	.934	12

Data from higher education, digitalization, Z (born 1995–2010) as well as Alpha (born after 2010) generations, hybrid and digital education, and all participant demographics were subjected to the Cronbach's Alpha results rising from the reliability test. The analysis showed that items possessed a Cronbach Alpha coefficient exceeding 0.70 assess the same attribute and exhibit internal consistency. (Cronbach's Alpha = .832, > 0.70).

The scale's items that have a Cronbach Alpha coefficient exceeding 0.70 were determined to evaluate the same attribute and demonstrate internal consistency, as indicated by the results arisen from the Cronbach Alpha test conducted on the digitalization scale. (Cronbach's Alpha = .882, > 0.70).

The scale's items that have a Cronbach Alpha coefficient exceeding 0.70 were determined to evaluate the same attribute and demonstrate internal consistency, as indicated by the results arisen from the Cronbach Alpha test conducted on the higher education scale. (Cronbach's Alpha = .894, > 0.70).

The scale items that have a Cronbach Alpha coefficient exceeding 0.70 were determined to evaluate the same attribute and demonstrate internal consistency, as indicated by the results arisen from the Cronbach Alpha test conducted on the Generation Z and Generation Alpha scales. (Cronbach's Alpha = .913, > 0.70).

The scale items that have a Cronbach Alpha coefficient exceeding 0.70 were determined to evaluate the same attribute and demonstrate internal consistency, as indicated by the results arisen from the Cronbach Alpha test conducted on the hybrid and digital education scales. (Cronbach's Alpha = .934, > 0.70)

Table 3. Normality Test

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Digitalization Scale Averages	,093	346	,000	,935	346	,000

a. Lilliefors Significance Correction

Gender variables were subjected to the normal distribution test after the calculation of the average scores on the digitalization scale. Test finding failed to demonstrate the anticipated normal distribution. P < .05, P = .000. Nevertheless, values of skewness and kurtosis have been verified (skewness = -0.968, kurtosis = 2.720) as the scale scores of normal distributions regarding Likert-type cannot be commonly observed. As a value ranging from -2 to +2 was observed, the data was deemed to exhibit normality.

Table 4. T-Test for Independent Groups

Groups	N	X	Ss	sd	t	P
Male	105	3.9390	.07325	211	.823	.411
Female	108	4.0241	.07284			

1st Hypothesis: A disparity exists among groups of gender concerning the significance of digitalization.

Independent groups t-test considering 1st Hypothesis revealed no discernible disparity between the means of the significance attributed to digitalization and gender. (p > .05, p = .411). Therefore, 1st Hypothesis is disproved in this instance and is not acknowledged as true. Regardless of gender, this circumstance can also be seen as a persistent focus on digitalization.

Table 5. One-Way ANOVA Test regarding Educational Grades regarding the significance attributed to digitalization

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6.626	6	1.104	2.579	.019
Within Groups	145.160	339	.428		
Total	151.786	345			

2nd Hypothesis: A disparity exists among groups of education concerning the significance of digitalization.

One-Way ANOVA test results considering 2nd Hypothesis indicated a considerable disparity in the significance attributed to digitalization across varying educational grades. (p < .05, p = .019, F(6.339) = 2.579).

Bonferroni correction had been used being a post-hoc analysis identifying differences across several groups. The test results indicate that secondary school graduates place less value on digitalization compared to individuals with other educational backgrounds (P < .05).

Effect size = Partial eta-squared = $\chi = \frac{\quad}{\quad}$ = 0.43

The grade of education variable accounts for 43% of the variance regarding the significance attributed to digitalization. Identical primary variables and outcomes as the initial table were exhibited in normal distribution test, confirming that the test variables were normally distributed, which had been validated by justifications presented in Table 3. Therefore, 2nd Hypothesis is accepted as well as considered having validity.

Table 6. One-Way ANOVA Test regarding Significance Attributed to Digitalization accompanied by Social Condition

			Sum of Squares	df	Mean Square	F	Sig.
Between Groups	(Combined)		7.677	2	3.838	10.926	.000
	Linear Term	Unweighted	.004	1	.004	.013	.910
		Weighted	.045	1	.045	.128	.720
		Deviation	7.632	1	7.632	21.723	.000
Within Groups			482.008	1372	.351		
Total			489.685	1374			

3rd Hypothesis: A disparity exists among groups of social conditions concerning the significance of digitalization.

One-Way ANOVA test results considering 3rd Hypothesis indicates a considerable disparity in the significance attributed to digitalization across varying groups of social condition. ($p < .05$, $p = .000$).

Bonferroni correction had been used being a post-hoc analysis identifying differences across several groups. The test results indicate that academics prioritize digitalization less than top managers do. ($P < .05$).

Effect size = Partial eta-squared = x = 7.677/489.685 = 0.015

Variable regarding socioeconomic condition accounts for 15% of the variance regarding the significance attributed to digitalization. Identical primary variables and outcomes as the initial table were exhibited in normal distribution test, confirming that the test variables were normally distributed, which had been validated by justifications presented in Table 3. Therefore, 3rd Hypothesis is accepted as well as considered having validity.

Table 7. Normal Distribution Test of the Significance Attributed to Digital Education

	Kolmogorov-Smirnov[a]		
	Statistic	df	Sig.
Digital Education	.064	1375	.000

a. Lilliefors Significance Correction

Gender variable was subjected to the normal distribution test after the calculation of the average scores on the digital education scale and weighing of data. Test finding failed to demonstrate the anticipated normal distribution. ($P < .05$, $P = .000$). Nevertheless, values of skewness and kurtosis have been verified (skewness = -0.858, kurtosis = 2.030) as the scale scores of normal distributions regarding Likert-type cannot be commonly observed. As a value ranging from -2 to +2 was observed, the data was deemed to exhibit a normal distribution.

Gender variables were subjected to the normal distribution test subsequent to the calculation of the average scores on the digitalization scale. Test finding failed to demonstrate the anticipated normal distribution. $P < .05$, $P = .000$. Nevertheless, values of skewness and kurtosis have been verified (skewness = -0.968, kurtosis = 2.720) as the scale scores of normal distributions regarding Likert-type cannot be commonly observed. As a value ranging from -2 to +2 was observed, the data was deemed to exhibit normal distribution.

Table 8. Independent Groups T-Test for Significance Attributed to Digital Education and Gender

	GENDER	N	Mean	Std. Deviation	Std. Error Mean
Digital Education	MALE	392	3.9177	.76165	.03847
	FEMALE	416	4.0512	.77475	.03797

Table 9. Continuation of Independent Groups T-Test

t	2.469
p	.014

4th Hypothesis: A disparity exists among gender groups concerning the significance of digital education.

Independent groups t-test considering 4th Hypothesis revealed discernible disparity between the means of the significance attributed to digitalization education and gender. ($p > .05$, $p = .411$). Therefore, 4th Hypothesis is accepted as well as considered having validity.

Table 10. One-Way ANOVA Test for Significance Attributed to Digital Education and Levels of Education

			Sum of Squares	df	Mean Square	F	Sig
Between Groups	(Combined)		74.186	6	12.364	20.695	.000
	Linear Term	Unweighted	.944	1	.944	1.580	.209
		Weighted	50.162	1	50.162	83.959	.000
		Deviation	24.024	5	4.805	8.042	.000
Within Groups			737.259	1234	.597		
Total			811.444	1240			

5th Hypothesis: A disparity exists among groups of education concerning the significance of digital education.

One-Way ANOVA test results considering 5th Hypothesis indicates a considerable disparity in the significance attributed to digital education across varying groups of education. ($p < .05$, $p = .000$).

Bonferroni correction had been used being a post-hoc analysis identifying differences across several groups. The test results indicate that graduates of secondary school prioritize digital education less than other groups do. ($P < .05$).

Effect size = Partial eta-squared = x = 74.186/811.444 = 0.091

Variable regarding educational grades accounts for 91% of the variance regarding the significance attributed to digital education.

Identical primary variables and outcomes as the initial table were exhibited in normal distribution test, confirming that the test variables were normally distributed, which had been validated by justifications presented in Table 7. Therefore, 5th Hypothesis is accepted as well as considered having validity.

Table 11. One-Way ANOVA Test for Significance Attributed to Digital Education and Social Condition

			Sum of Squares	df	Mean Square	F	Sig.
Between Groups	(Combined)		61.528	2	30.764	50.787	.000
	Linear Term	Unweighted	6.665	1	6.665	11.004	.001
		Weighted	3.872	1	3.872	6.392	.012
		Deviation	57.656	1	57.656	95.182	.000
Within Groups			749.916	1238	.606		
Total			811.444	1240			

6th Hypothesis: A disparity exists among groups of social conditions concerning the significance of digital education.

One-Way ANOVA test results considering 6th Hypothesis indicate a considerable disparity in the significance attributed to digital education across varying groups of social condition. ($p < .05$, $p = .000$).

Bonferroni correction had been used being a post-hoc analysis identifying differences across several groups. The test results indicate that academics prioritize digital education lower than business world or students do. ($P < .05$).

Effect size = Partial eta-squared = x = 61.528/811.444 = 0.075

Variable regarding socioeconomic condition accounts for 75% of the variance regarding the significance attributed to digital education. Identical primary variables and outcomes as the initial table were exhibited in normal distribution test, confirming that the test variables were normally distributed, which had been validated by justifications presented in Table 7. Therefore, 6th Hypothesis is accepted as well as considered having validity.

Table 12. Normality Test

	Kolmogorov-Smirnov[a]		
	Statistic	df	Sig.
Digital significance	.082	1242	.000
Higher education	.074	1242	.000

a. Lilliefors Significance Correction

Mean values for the significance attributed to digitalization as well as university education were calculated, followed by a normality test. Test finding failed to demonstrate the anticipated normal distribution. ($P < .05$, $P = .000$). Nevertheless, values of skewness and kurtosis have been verified (skewness = -.868, kurtosis = 2.376) as the scale scores of normal distributions regarding Likert-type cannot be commonly observed. As a value ranging from -2 to +2 was observed, the data was deemed to exhibit normal distribution.

Table 13. Pearson Correlation Analysis for significance attributed to digitalization and significance attributed to digital education

		Digitalization	Digital Education
Digital	Pearson Correlation	1	.699**
	Sig. (2-tailed)		.000
	N	1375	1375
Digital Education	Pearson Correlation	.699**	1
	Sig. (2-tailed)	.000	
	N	1375	1375

**. Correlation is significant at the 0.01 level (2-tailed).

7th Hypothesis: A correlation exists between the significance of digitalization and the significance of digital education.

Findings in Pearson Correlation Test for 7th Hypothesis indicated the fact that significance ratings attributed towards digitalization and those assigned towards digital education were positively and significantly correlated ($r = .699$, $p < .05$, $p = .000$). Therefore, 7th Hypothesis is accepted as well as considered having validity.

Table 14. Pearson Correlation Analysis for significance attributed to digital education and significance attributed to higher education

		Digital Education	Higher Education
Digital Education	Pearson Correlation	1	.615**
	Sig. (2-tailed)		.000
	N	1242	1242
Higher Education	Pearson Correlation	.615**	1
	Sig. (2-tailed)	.000	
	N	1242	1242

**. Correlation is significant at the 0.01 level (2-tailed).

8th Hypothesis: A correlation exists between significance of digital education and significance of higher education.

Findings in Pearson Correlation Test for 8th Hypothesis indicated the fact that significance ratings attributed towards higher education and those assigned towards digital education were positively and significantly correlated ($r = .615$, $p < .05$, $p = .000$). Therefore, 8th Hypothesis is accepted as well as considered having validity.

In conclusion, reliability studies using Cronbach's Alpha were performed for every sub-category as well as the total data, confirming the test results' reliability. Three distinct areas were created using the average results of the 5-point Likert scale used to evaluate the degree for significance assigned to "Digitalization," "Digital Education," and "Higher Education." The adjustment of data as well as were conduct of requisite hypothesis tests were completed for each subcategory. According to the hypotheses derived from the test findings, seven from eight hypotheses are accepted as well as considered having validity. One hypothesis is disproved in this instance and is not acknowledged, so is rejected.

The analysis of the gender variable in the gathered data indicates no substantial variation in the importance assigned to digitalization by gender, suggesting that digitalization is equally significant over male as well as female participants. Nonetheless, test data reveals a substantial disparity among the groups of gender and the significance attributed towards digital education. Consequently, although the importance assigned to digitalization is consistent across genders, the emphasis placed on digital education varies. The tests conducted based on the gender variable reveal that academics attribute less significance to digitalization than senior managers.

The analysis of the education level variable in the data indicated a substantial disparity in the average scores with regard to the significance assigned to digitalization based on education level, as well as a substantial disparity in the average scores related to the significance attributed to digital education. Concerning tests indicate that graduates of secondary school attribute less significance towards digitalization as well as digital education than individuals having higher educational qualifications, including high school graduates, students pursuing formal undergraduate studies besides, degree holders of undergraduate, postgraduate and Ph.D.

The tests conducted using the variable regarding socioeconomic condition within the collected data indicate that the significance attributed towards digital education varies, as does the significance attributed to digital education. The analyses performed using this variable indicate that academic participants attribute less significance to digitalization than senior managers, while academic people regard digital education as less significant in comparison to employers as well as students.

The acquired data reveals two distinct test outcomes reflecting the average significance attributed to digital education. The outcomes of the tests demonstrate a linear and substantial correlation between

participants' significance to digitalization and their significance to digital education, as well as a linear and substantial correlation between the significance towards higher education and the significance for digital education."

Regarding the policy and practical implications for higher education, this study aligns with Rosak-Szyrocka (2025) by providing guidance for university administrators, policymakers, and educators. It assists them in effectively formulating and implementing digital university approaches that address the demands of the contemporary business world, thereby ensuring that higher education institutions maintain competitiveness and relevance. Notably, governance policies at higher education institutions should incorporate digital literacy and emerging technology training for academic staff. Furthermore, institutions should restructure courses to meet the skill requirements of new-generation undergraduates (Asad et al., 2026), thereby satisfying the demands of employers and managers seeking qualified human resources.

Universities should be regarded as strategic entities in the development of broad, robust, and accountable digital communities (Olszak & Sączewska-Piotrowska, 2025). Moreover, universities must implement systems for the continual evaluation of the efficacy of digital educational approaches and execute requisite modifications (Ngqunguza et al., 2024).

The era beyond 2030 will require a substantially greater proportion of scholars with digital proficiency, as they will be essential to cultivating a competent, specialized workforce. Therefore, scholars need to acknowledge the benefits of digital education opportunities while understanding that digital transformation will chiefly influence instructional methodologies. In contrast, the essential foundations of higher education—specifically academic content and faculty competence—will remain unaltered during the University 5.0 era and beyond. Notably, the World Economic Forum forecasts that more than 50% of jobs by 2030 will necessitate digital technology skills (Marr, 2023). This projection highlights an increasing demand among employers and managers for competent graduates capable of adeptly utilizing digital applications and platforms to address challenges and create value. Lifelong learning will undoubtedly remain vital in the face of ongoing change and advancement. Ultimately, digital higher education institutions within the University 5.0 era will proficiently and universally fulfill this need.

CONCLUSION

Prospective students will increasingly gravitate toward universities that adeptly embrace the digital era and proactively anticipate change. This preference is driven by the flexibility of time and location, which accommodates their future requirements for professional advancement or career transitions post-graduation.

The pace of digital change in higher education has significantly accelerated over the past two decades, particularly during the COVID-19 pandemic. Consequently, traditional higher education frameworks are anticipated to transition toward the digital university structure within the near future. In summary, esteemed traditional institutions are expected to persist, while online universities emerge as formidable rivals. Digital innovations—including Web 3.0, VR, AR, blockchain technology, and the emerging metaverse—are progressing swiftly, requiring higher education institutions to adapt to these transformative shifts over the coming decades. The Industry 4.0 era is inherently digital; therefore, higher education institutions have progressively embraced digitalization in line with the University 4.0 paradigm.

This study suggests that universities are likely to adopt hybrid educational models by 2030 in response to marketplace demands, though the rates of adoption will vary across fields of study, including the social sciences, engineering, and medicine. After 2030, conventional institutions will persist in employing hybrid models, while digital universities will inevitably expand. According to this study, entirely digital universities—also known as the University 5.0 model—are poised to become an inevitable part of the university paradigm by the end of the third decade of the 21st Century.

REFERENCES

Akhmetshin, E. M., Vasilev, V. L., Kozachek, A. V., Meshkova, G. V., & Mikhailova, M. V. (2021). Development of Digital University Model in Modern Conditions: Institutional Approach. *Digital Education Review*, (40), 17-32.

Alexander, B., Ashford-Rowe, K., Barajas-Murph, N., Dobbin, G., Knott, J., McCormack, M., & Weber, N. (2019). *Horizon report 2019 higher education edition* (pp. 3-41). EDU19.

Anderson, R. D. (2004). European Universities from the Enlightenment to 1914. Oxford Academic.

Aquino, J., Alarcón, R., Guevara, L., Bravo-Jaico, J., Germán, N., Valdivia-Salazar, C., ... & Tesén-Arroyo, A. (2025). Impact of digital transformation: assessing the knowledge and adoption of disruptive technologies in a higher education institution. *Frontiers in Computer Science*, *7*, 1611952.

Asad, M. M., Rind, A. A., & Almusharraf, N. M. (2026). Challenges and mitigating strategies for sustainable development of digitally transformed community 5.0: Insights from the higher education leadership. *Asian Education and Development Studies*, 1-23.

Baumöl, U., & Bockshecker, A. (2017, July). Evolutionary change of higher education driven by digitalization. In *2017 16th International Conference on Information Technology Based Higher Education and Training (ITHET)* (pp. 1-5). IEEE.

Berman, E. P. (2011). Creating the market university. In *Creating the Market University*. Princeton University Press.

Berman, E. P. (2012). Explaining the move toward the market in US academic science: How institutional logics can change without institutional entrepreneurs. *Theory and Society*, *41*(3), 261-299.

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

Carayannis, E. G., & Morawska, J. (2023). University and education 5.0 for emerging trends, policies and practices in the concept of industry 5.0 and society 5.0. In *Industry 5.0: Creative and Innovative Organizations* (pp. 1-25). Cham: Springer International Publishing.

Çubukçu, C., & Akturk, C. (2020). Digital transformation to university 4.0: A roadmap. *Uludağ University Journal of the Faculty of Engineering*, *25*(3), 1391-1408.

Dhameria, V., Muazeib, A. I. M., Blhaj, K. M. S., Sugiyarsih, S., & Rosadah, R. A. (2025). The impact of digital transformation in higher education management: Integrating online learning and educational applications for efficiency and accessibility. *International Journal of Educational Qualitative Quantitative Research*, *4*(1), 15-24.

Egliston, B., & Carter, M. (2020). Oculus imaginaries: The promises and perils of Facebook's virtual reality. *New Media & Society*, 1461444820960411.

Geiger, R. L. (2004). Knowledge and money: Research universities and the paradox of the marketplace. Stanford University Press.

Greener, R. (2021, December 16). *Meta, VictoryXR to Launch 10 Metaverse Campuses*. XrToday.https://www.xrtoday.com/virtual-reality/meta-victoryxr-to-launch-10-metaverse-campuses/

Gravett, K., Ajjawi, R., & O Shea, S. (2025). Topologies of belonging in the digital university. *Pedagogy, culture & society*, *33*(2), 597-611.

Gurieva, L. K., Btemirova, R. I., & Kovaleva, M. A. (2019, December). University 4.0: new education technologies in the digital economy. In *International Scientific and Practical Conference on Digital Economy (ISCDE 2019)* (pp. 211-216). Atlantis Press.

Hadhazy, A. (2021, October 5). Stanford course allows students to learn about virtual reality while fully immersed in VR environments. Stanford News.

Hall, B. H. (2004). Exploring the patent explosion. *The Journal of Technology Transfer*, *30*(1), 35-48.

Hidalgo, H. E. H., Córdova, P. G. G., Telenchana, L. S. L., & Bastidas, J. O. G. (2025). Higher education 5.0: AI-based strategies for transforming the university ecosystem. *Salud, Ciencia y Tecnología-Serie de Conferencias*, *4*, 3.

Kasmia, N. B., & M'hamed, H. (2023). Digitalization of higher education: Impacts on management practices and institutional developement. A literature review. *Conhecimento & Diversidade*, *15*(39), 56-82.

Kraus, S., Kanbach, D. K., Krysta, P. M., Steinhoff, M. M., & Tomini, N. (2022). Facebook and the creation of the metaverse: radical business model innovation or incremental transformation? *International Journal of Entrepreneurial Behavior & Research*, Vol.28, No.9, pp. 52-77.

Link, A. N. (2002). From seed to harvest: the history of the growth of the triangle park research. Research Triangle Park: NC: University of North Carolina Press for the Research Triangle Foundation of North Carolina.

Link, A. N., & Scott, J. T. (2017). Opening the ivory tower's door: An analysis of the determinants of the formation of US university spin-off companies. In *Universities and the entrepreneurial ecosystem* (pp. 37-43). Edward Elgar Publishing.

Mammadov, R., & Aypay, A. (2020). Efficiency analysis of research universities in Turkey. *International Journal of Educational Development*, *75*, 102176.

Marr, B. (2023, February 14). The Top Ten In-Demand Skills For 2030. Forbes. https://www.forbes.com/sites/bernardmarr/2023/02/14/the-top-10-in-demand-skills-for-2030/?sh=27ce072b2fb9

Mitha, S. B., & Omarsaib, M. (2025). Emerging technologies and higher education libraries: a bibliometric analysis of the global literature. *Library Hi Tech*, *43*(2-3), 1248-1270.

Mosteanu, N. R. (2021). Digital Campus–a future former investment in education for a sustainable society. In *E3S Web of Conferences* (V.234, p. 29-34). EDP Sciences.

Mowery, D. C., & Sampat, B. N. (2004). The Bayh-Dole Act of 1980 and university–industry technology transfer: a model for other OECD governments? *The Journal of Technology Transfer*, *30*(1), 115-127.

Mystakidis, S. (2022). Metaverse. *Encyclopedia*, *2*(1), 486-497.

Nagy, Á., & Kölcsey, A. (2017). Generation Alpha: marketing or science. *Acta Educationis Generalis*, *7*(1), 107-115.

Nazyrova, A., Miłosz, M., Bekmanova, G., Omarbekova, A., Aimicheva, G., & Kadyr, Y. (2025). The digital transformation of higher education in the context of an AI-driven future. *Sustainability*, *17*(22), 9927.

Nelson, R. R. (2001). Observations on the post-Bayh-Dole rise of patenting at American universities. *Journal of Technology Transfer*, *26*(1-2), 13.

Ngqunguza, A., Seleke, Z., & Makhoba, T. I. (2024). Digital transformation in higher education: Leadership strategies for ensuring equity and inclusion in digital learning environments. *Journal of Public Administration and Development Alternatives (JPADA)*, *9*(2), 101-114.

Olszak, C. M., & Sączewska-Piotrowska, A. (2025). The role of higher education institutions in shaping sustainability and digital ethics in the era of industry 5.0: Universities as incubators of future skills. *Sustainability*, *17*(19), 8530.

Patomäki, H. (2019). Repurposing the university in the 21st century: Toward a progressive global vision. *Globalizations*, *16*(5), 751-762.

Pavlov, P. V., & Zashchitina, E. K. (2020). World-class university in the era of digitalization. *RUDN Journal of Economics*, *28*(4), 681-699.

Polyportis, A., & Pahos, N. (2025). Understanding students' adoption of the ChatGPT chatbot in higher education: the role of anthropomorphism, trust, design novelty and institutional policy. *Behaviour & Information Technology*, *44*(2), 315-336.

Powell, J. J., Baker, D. P., & Fernandez, F. (Eds.). (2017). *The Century of Science: The global triumph of the research university*. Emerald Group Publishing.

Qin, N. (2022, January 17). *Top Chinese university launches on Baidu's metaverse*. Forekast. https://forkast.news/headlines/chinese-university-launch-baidu-metaverse/

Reuters (2021, October 18). Facebook plans to hire 10,000 in EU to build 'metaverse' [Press Release).

https://www.reuters.com/technology/facebook-plans-hire-10000-eu-build-metaverse-2021-10-17/

Rosak-Szyrocka, J. (2025). Engineering the future of higher education: A VOSviewer analysis of smart university trends in the digitalization and Industry 5.0 era. *Management Systems in Production Engineering*.

Sabzalieva, E., Chacon, E., & Liu, B. L. (2021). Thinking higher and beyond: perspectives on the futures of higher education to 2050.

Sheail, P. (2018). The digital university and the shifting time–space of the campus. *Learning, Media and Technology*, *43*(1), 56-69.

Siegel, D. S., Waldman, D., & Link, A. (2003). Assessing the impact of organizational practices on the relative productivity of university technology transfer offices: an exploratory study. *Research Policy*, *32*(1), 27-48.

Solomon, B. (2014, March 25). *Facebook buys Oculus virtual reality gaming start-up for $ 2 billion.* Forbes. https://www.forbes.com/sites/briansolomon/2014/03/25/facebook-buys-oculus-virtual-reality-gaming-startup-for-2-billion/?sh=170848ec2498

Terr, A. (2022, February 9). *UM class enters the future with virtual reality class*. The Miami Hurricare. https://www.themiamihurricane.com/2022/02/09/um-class-enters-the-future-with-virtual-reality-class/

Zhukabayeva, T., Baumuratova, D., Zholshiyeva, L., Karabay, A., & Abdrakhmanov, K. (2025). Digital transformation in higher education: Toward a national model of digital university in Kazakhstan through global and local comparison. *Sustainability*, *17*(24), 11132.

Zou, Y., Kuek, F., Feng, W., & Cheng, X. (2025, March). Digital learning in the 21st century: trends, challenges, and innovations in technology integration. In *Frontiers in Education* (Vol. 10, p. 1562391). Frontiers Media SA.

Zwaan, B. (2025). *Higher education in 2040: A global approach* (p. 256). Taylor & Francis.