A Review of the Concept of University 5.0

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Abstract. The revolutionary concept of "University 5.0" aims to transform universities into hubs of social and digital innovation. It emphasizes creating supportive structures and mechanisms, integrating sustainability and interdisciplinary approaches, and promoting cross-sector collaboration. This vision seeks to address contemporary global challenges and prepare students for a rapidly evolving world.

This paper aims to contribute to the scientific comprehension and definition of this new concept, by exploring how the implementation of a social-oriented quality management approach can potentially bring about the fulfilment of this vision.

A literature review was conducted to collect and study previous papers regarding this novel topic. Using the Scopus, Web of Science and Google Scholar databases, articles were obtained based on the following string of keywords present in the abstract: ("education 5.0" OR "university 5.0" OR "smart university" OR "university 4.0") AND ("quality" OR "digital" OR "sustainability") considering articles published from 2019 to 2025.

The results are focused on the main pillars of University 5.0, the potential benefits of its implementation in universities, and finally the obstacles that may be encountered in the process. This paper's findings can be helpful to university practitioners, managers, and other stakeholders as a guide for comprehending the concept of University 5.0 and the advantages of incorporating this approach into the strategic goals of higher education institutions.

Keywords: Higher education, Quality management, Social-oriented quality, Smart university, Education 5.0, Sustainability, Innovation.

1 Introduction

Higher education institutions (HEIs) are currently facing rapid societal transformations, and to cope they are undertaking a swift process of adaptation, by restructuring their organizational frameworks and internal operational environments. This widespread reshaping of the higher education sector is an integral component of the ongoing fifth-generation revolutions and is referred to as "University 5.0" (U5.0) and "smart university" [1,2]. The practical implementation of these "smart universities" will gain momentum around the 2030s. To adequately prepare future graduates with the necessary

competencies and understanding demanded by I4.0 and I5.0, HEIs must undergo a profound transition towards the U5.0 paradigm [3].

The attainment of a high standard of tertiary education forms the bedrock of sustainable development across all dimensions. As a crucial aspect of the U5.0 framework, HEIs must inherently foster a balance between environmental, societal, and economic sustainability to successfully navigate the uncertainties of the geopolitical climate and the increasing prevalence of digitization [4, 5]. These institutions hold a fundamental position as the architects and proponents of new knowledge within society. Consequently, the future trajectory of society is contingent upon the quality of education received by both current and prospective graduates [6, 7]. Furthermore, the establishment and refinement of processes that ensure enhanced educational quality will benefit future citizens and promote social progress. In fact, a HEI can be characterized as a sustainable institution if it cultivates high-quality teaching, implements advanced innovative processes that enhance the academic quality of life, and optimizes its use of natural resources. Enriching the student learning experience with principles of sustainable development is essential for the establishment of a Society 5.0 and for fulfilling the United Nations' Sustainable Development Goals (SDGs) [8].

The U5.0 paradigm encompasses the ongoing and dynamic collaboration among five key dimensions: industry, government, the university itself, society, and the natural environment. Experts characterize it as an innovative and beneficial ecosystem, centered around human needs, where institutions can collaborate in the creation and dissemination of knowledge that is crucial for fostering innovative change. To protect this ecosystem of innovation, clear and distinct vision and mission statements must be formulated and subsequently integrated into the HEI's strategic framework, while taking into account all relevant legal, social, and ethical considerations [9].

Universities must possess the ability to understand the specific competencies required by their graduates and align their teaching and assessment practices to place students at the heart of the educational process. Research has indicated that empowering students to design and manage their own personalized learning pathways, tailored to their individual needs, aspirations, and creativity, positively influences their academic performance and success [10]. In fact, through the implementation of the digital U5.0 approach, students assume a more central, proactive, and independent role in their education, while teachers and lecturers transition into the roles of mediators and facilitators in this process. This shift places the responsibility on educators to develop appropriate curricula that revolve around digital skills, green literacy, cognitive and metacognitive abilities, social and emotional skills, as well as practical and physical skills that incorporate modern communication technologies [11].

A gap in literature has been identified as a holistic framework for the U5.0 paradigm does not exist yet. With this study, the state-of-the-art of the literature on the concept of U5.0 has been mapped to attempt to respond to the following research question: What are the main elements of the U5.0 paradigm and what are the potential impacts and challenges of its implementation? This review contributes to the current research on the topic, as well as being a useful tool for university managers, innovators, and policymakers.

2 Methodology

A thorough examination of existing scholarly work concerning the advancement of the U5.0 concept and its possible impact on tertiary education was undertaken. This review was conducted in February 2025, following a structured six-step process as outlined by Barry et al. in 2022 [12]. Table 1 details the specific protocol employed for this review. The search for relevant literature was conducted using the Scopus, Web of Science, and Google Scholar electronic databases. The key terms used for the search (see Tab. 1) were chosen after a brainstorming session and examined within the title, abstract and keywords sections of the articles in the databases. The timeframe of publication was 2019-2025, as the term "University 5.0" was first mentioned in an article published in 2019. Despite the general tendency to exclude conference papers, this particular study chose to include them, along with book chapters, to gather all potential knowledge within this relatively new area of investigation. The selection of papers for the review was based on their contribution to the evolution of the U5.0 concept and its implementation and impacts on the higher education sector. The final set of papers chosen did not include all other forms of grey literature. Additionally, papers were excluded if the research design and arguments presented were unclear. Furthermore, the bibliographies of the identified papers were consulted to broaden the selection of any relevant material.

It was noted that there were very few papers specifically focused on U5.0. However, articles that discussed U4.0 and the aspects of sustainability applied to the higher education sector were considered. This is because many of these papers touched upon the potential future directions of the U5.0 concept. The research gathered was independently assessed based on the established review protocol (see Tab. 1). This protocol had been previously checked through a preliminary review of ten articles, where the findings were briefly compared. This step was taken to ensure that the reviewers had a similar understanding and to account for any personal biases in interpretation.

The baseline sample of 271 results was obtained after excluding duplicates. Subsequently, through a title and abstract screening, a further 191 were removed to concentrate on articles that address the concept of University 5.0, its implementation, and potential impacts, leading to a final set of 81 articles to be reviewed. Furthermore, the data were subdivided into categories according to the themes studied in the papers.

Table 1. Inclusion and exclusion criteria.

Item	Description
Keywords	education 5.0, university 5.0, smart university, university 4.0, quality, digital, sustainability.
Inclusion	Papers that focus on the development of the U4.0/5.0 and E5.0 concepts, sustainable quality management in HEIs, integrating practices regarding the three aspects of sustainability in HEI strategic planning and quality management, digital transition in HEIs.

Exclusion	Papers not written in English; papers focused on the concept of Education 4.0/5.0 in primary or secondary education.

3 Results

After analyzing the selected articles, the following bibliometric data was obtained. Firstly, the very first article addressing the topic of U5.0 was published in 2019, with a peak of interest in 2024 (25). It can be noted that 2 articles have already been published this year showing that interest in the topic has not waived (Fig. 1).

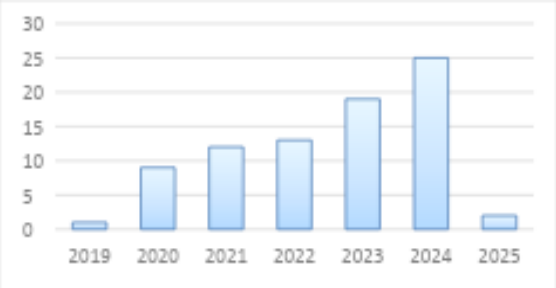

Fig. 1. Number of articles per year of publication.

Examining the nationality of the affiliation of the first author demonstrates that they are located across the main continents of the world: Asia (35), Europe (24), the Americas (11), Africa (9), Oceania (2). From the analysis, a number of recurring themes were identified, and the articles were labelled according to the cluster(s) they were most connected to. The five clusters detected are digitalization (65), enhanced learning (48), sustainability (17), quality (5), and cyber security (2). These five clusters can be classified as the main elements that characterize the U5.0 paradigm. The papers reviewed are reported in Table 2, which summarizes the authors and the clusters with which each paper was associated.

Table 2. Keywords and clusters of the articles reviewed.

Cluster	Authors
Digitalisation	Nguyen & Nguyen-Dinh (2024); Elrashidy & ElSabry (2024); Escolar et al. (2023); Al-Shoqran & Shorman (2021); Hou et al. (2020); Duda et al. (2023); Akhmetshin et al. (2021); Azarov & Shaposhnikov (2022); Minh et al. (2024); Mitrofanova et al. (2021); Cavus et al. (2022); Azarov & Chekmarev (2022); Pupiales-Chuquin et al. (2022); Pham et al. (2020); Polin et al. (2024); Mohanachandran et al. (2021); Berdnikova et al. (2021); Rico-Bautista et al. (2020); Berdnikova et al. (2020); Kwet & Prinsloo (2020); Alexander et al. (2021); Kerroum et al. (2020); Abdellatif (2019); Chauhan et al. (2024); Ülker & Otrar (2024); Sherstobitova et al. (2021);

	Daradkah et al. (2023); Hutahaean et al. (2024); Nikum (2022); Sherstobitova et al. (2021); Meniado (2023); Gowda (2023); Dehbi et al. (2025); Rajagopal et al. (2024); Giang et al. (2021); Kulik et al. (2020); Jugembayeva & Murzagaliyeva (2024); Rocha et al. (2022); Rial-Gonzalez et al. (2024); George & Wooden (2023); Pinheiro & Santos (2023); Jugembayeva & Murzagaliyeva (2023); Huang & Wei (2023); Avrami et al. (2024); Kazieva et al. (2020); Azevedo et al. (2023); Chernaya et al. (2023); Acuñar (2024); Nikolova et al. (2023); Elshapasy & Mohamed (2024); Silva-da-Nóbrega et al. (2022); de Moraes et al. (2024); Oughannou et al. (2022); Abnoulgid et al. (2024); Kostepen et al. (2020); Al-Dmour (2023); Habash (2022); Tavares et al. (2022); Babkin et al. (2024); Rosak-Szyrocka (2024); Polin et al. (2023); Gorina & Polyakova (2021); Carayannis & Morawska (2023); Asad & Suleman (2024); Petrescu et al. (2023).
Enhanced Learning	Luna et al. (2024); Skitso & Osypova (2022); Gartoumi & Tekouabou (2024); Hashim et al. (2024); Yakymchuk (2024); Ülker (2025); Vieira et al. (2023); Hamedani et al. (2024); Daradkah et al. (2023); Hutahaean et al. (2024); Nikum (2022); Sherstobitova et al. (2021); Meniado (2023); Gowda (2023); Dehbi et al. (2025); Rajagopal et al. (2024); Giang et al. (2021); Kulik et al. (2020); Jugembayeva & Murzagaliyeva (2024); Rocha et al. (2022); Rial-Gonzalez et al. (2024); George & Wooden (2023); Pinheiro & Santos (2023); Jugembayeva & Murzagaliyeva (2023); Huang & Wei (2023); Avrami et al. (2024); Kazieva et al. (2020); Azevedo et al. (2023); Chernaya et al. (2023); Acuñar (2024); Nikolova et al. (2023); Ciolacu et al. (2023); Akturk et al. (2022); Ramìrez-Montoya et al. (2024); Mpofu et al. (2024); Ülker (2023); Melnychenko et al. (2021); Kostepen et al. (2020); Al-Dmour (2023); Habash (2022); Tavares et al. (2022); Babkin et al. (2024); Rosak-Szyrocka (2024); Polin et al. (2023); Gorina & Polyakova (2021); Carayannis & Morawska (2023); Asad & Suleman (2024); Petrescu et al. (2023).
Sustainability	Giesenbauer et al. (2021); Elshapasy & Mohamed (2024); Silva-da-Nóbrega et al. (2022); de Moraes et al. (2024); Ciolacu et al. (2023); Akturk et al. (2022); Ramìrez-Montoya et al. (2024); Mpofu et al. (2024); Kostepen et al. (2020); Al-Dmour (2023); Habash (2022); Tavares et al. (2022); Babkin et al. (2024); Rosak-Szyrocka (2024); Polin et al. (2023); Gorina & Polyakova (2021); Carayannis & Morawska (2023).
Cyber Security	Raju et al. (2022); Oughannou et al. (2022).
Quality	Abnoulgid et al. (2024); Ülker (2023); Melnychenko et al. (2021); Asad & Suleman (2024); Petrescu et al. (2023).

4 Discussion

In the contemporary educational landscape, the use of technology is pervasive and is continuously advancing and evolving, greatly influencing the learning environment. Digitalization presents novel opportunities for HEIs and can become one of the main catalysts for institutional transformation. The implementation of information and communications technology (ICT) necessitates a shift in the organizational ethos of universities and dedication from all staff members. The incorporation of ICTs is of paramount importance in the transition towards the U5.0 paradigm, which imagines a state-of-the-art educational setting, in which technology is seamlessly incorporated into all facets of learning and teaching, consequently transforming conventional educational frameworks [13, 14].

In fact, a defining characteristic of a smart university is its strategic application of technology with the objectives of enhancing the student experience, optimizing operational efficiency, and cultivating innovation [15]. Furthermore, this smart model aims to elevate scientific output, reduce expenditures, improve educational quality standards, and facilitate teaching and learning irrespective of geographical or temporal constraints [16]. The proliferation of online educational programs, virtual learning environments, and specialized software applications now allows individuals to pursue knowledge acquisition at an individually tailored schedule [15].

A smart campus, or "intelligent campus," is defined as a demarcated area upon which educational establishments are situated, and which possesses an inherent ability to adapt responsively to new circumstances that arise within its daily operational context through the implementation of ICT [17]. Furthermore, a smart learning environment is distinguished by its aptitude to furnish immediate and personalized support to learners through the immediate analysis of individual needs from multifaceted perspectives [16]. Conventional lecture-based teaching methodologies are increasingly being augmented or replaced by interactive, technology-driven approaches. The widespread adoption of smartphones and laptops facilitates students' rapid and easy access to an immense spectrum of information and educational resources. Moreover, interactive pedagogical tools, such as smartboards and virtual laboratories, furnish practical learning opportunities that were previously absent in traditional classroom settings. These technological innovations serve to enhance the overall learning experience and accommodate a diverse range of learning preferences, fostering equitable opportunities for all students to achieve academic success [13].

The Higher Education 5.0 paradigm requires innovation in teaching methodologies to cultivate skills that address industrial and societal demands, with the aim of solving global sustainability challenges. This paradigm is characterized as learner-related, learner-centered, and learner-driven, founded on a relevant curriculum, innovative evaluation, meaningful learning experiences, and transformative knowledge acquisition [18]. U5.0 advocates for the humane application of new technologies, prioritizing learners' societal well-being and emotional development. Furthermore, universities have a crucial role in fostering human-driven, sustainable, and creative innovation by developing new knowledge. Addressing challenges related to inadequate infrastructure and

the digital skills of both teachers and students is crucial for effective digital transformation [19].

In terms of the learning experience, the central challenge of U5.0 lies in reorienting individuals' knowledge and skills to ensure they are critical contributors in human-machine collaborations. This necessitates the development of various 21st-century competencies, encompassing technical and scientific literacy alongside abilities such as navigating complex systems, demonstrating flexibility, possessing strong communication skills, emotional intelligence, empathy, creativity, and critical thinking [20, 21]. It is a fundamental imperative to cultivate a workforce equipped with relevant digital knowledge, skills, and abilities to meet the evolving demands of organizations. This includes not only digital literacy skills, e-skills, internet skills, and media literacy, but also crucial transversal abilities such as autonomy, responsibility, social interaction, personal and professional development, leadership, entrepreneurship, problem-solving, and teamwork [22]. Universities should develop curricula that offer students practical application of their knowledge and the acquisition of new skills through project-based learning initiatives that address the needs of specific organizations or local communities. It is recommended to shift to innovative pedagogical approaches and curricular flexibility to promote and develop these soft skills and cater for the high degree of interculturality and interdisciplinarity that is manifested in this new digital age [23].

The concept of U5.0 emphasizes personalized education to cater to the diverse learning abilities, speeds, curiosities, and developmental stages of each learner. This necessitates flexible learning processes where students can independently shape their learning trajectories based on their interests and skill development needs. Technology plays a pivotal role in facilitating personalized learning through gamification, flipped classrooms, and project-based learning, enabling the creation of individualized learning pathways [24]. Furthermore, the rapid pace of technological change underscores the critical importance of lifelong learning and continuous professional development for both employees and educators. HEIs must encourage self-education and equip learners with the skills necessary for this pursuit [25].

Lecturers must also strategically incorporate opportunities for live communication to help develop these soft skills. Moreover, curricula should integrate interdisciplinary courses, utilize digital portfolios for assessment, and foster industry collaboration to ensure relevance and continuous improvement [26, 27]. Moreso, in this new fifth-generation university, students are expected to adopt central, active, and autonomous roles in their learning journeys, taking greater ownership of their educational pathways. Consequently, the traditional role of teachers as primary knowledge disseminators is evolving towards that of mediators of learning, while the direct transfer of factual knowledge can increasingly be supported by technology [28]. Teachers are now tasked with contributing to the moral and ethical development of students, alongside cultivating essential cognitive abilities and practical skills [20]. The role of professors is shifting away from a purely instructional focus towards that of guides in the learning process. The proactive use of ICT can allow professors to create interactive content in order to better keep students’ attention [29]. This enables them to personalize teaching by identifying and nurturing students' individual abilities for their future careers [30, 31].

Universities are increasingly prioritizing the development of sustainable digital advantages through the application of ethical technology. This strategic focus aims to enhance revenue performance, uphold sustainable priorities, and improve student retention, to align with the overarching vision of U5.0 to create a positive societal impact via educational delivery. The concept of smart campuses emphasizes the integration of technology to establish comprehensive and sustainable quality living environments that cater for the needs of stakeholders [32]. Furthermore, HEIs are urged to incorporate the United Nations' SDGs into their research and teaching activities. This is crucial for cultivating a culture of sustainability, empowering students with essential future competencies, and contributing to the 2030 Agenda. All HEIs must establish sustainability principles as a foundational element of their strategic direction. To effectively tackle real-world challenges, it is vital for universities to forge links with external stakeholders such as businesses, civic organizations, and government bodies [33].

However, the inherent complexity of sustainable development (SD), which requires a systemic transformation, slows down its mainstream adoption in academia. HEIs are being urged to implement SD as a whole-institutional approach to foster transformative practices across all levels. To do so, institutions must develop their capacity to address complexity and ambiguity through a wider perspective [34]. Establishing robust sustainability governance is fundamental for HEIs transitioning towards sustainability. This involves creating an organizational structure to measure the impact of sustainability efforts and fostering a culture of sustainability supported by evidence. Effective governance includes dimensions like politics, profession, organization, knowledge, and visibility, engaging students, administrative boards, campus management, and faculty. Key organizational culture characteristics supporting sustainability governance are responsibility for sustainable development, a clear purpose for HEIs, understanding of sustainability, and significant organizational changes [35].

Sustainability is increasingly being incorporated into curricula and policies. Sustainability policies in HEIs aim to embed this theme across teaching, research, and institutional practices, positioning them as leaders in promoting sustainable change. The U5.0 paradigm, centering human well-being and leveraging technology for sustainable development, can further drive these policies [7].

HEIs significantly influence community and social sustainable development through their economic and social impacts. Monetarily valuing colleges' social impacts helps identify social needs and fosters collaboration with sustainable development stakeholders. Active and responsible community-HEI partnerships are intellectually beneficial for all those involved, as they facilitate the sharing of knowledge and resources. To lead in sustainability, HEIs must develop cross-disciplinary research plans [3]. Furthermore, U5.0 has the potential to enhance accessibility and inclusivity in higher education, ensuring equal access to knowledge and training. Education is crucial for driving social change by empowering educators and students to advocate for equitable practices. Fostering inclusive societies involves cultivating skills in sustainable development and fundamental rights. HEIs must actively promote inclusive learning experiences to aid the elimination of injustice and gender-based violence [31]. Additionally, organizations should prioritize the provision of fair, safe, and equitable workplace environments for both their employees and stakeholders. This is crucial for upholding workplace ethical

conduct. Policymakers should underscore the significant role of human resources in ensuring the sustainability of the HEI and foster innovation aimed at enhancing this. HEIs bear the responsibility of equipping students with essential interpersonal skills to adequately prepare them for the demands of the professional sphere [7].

The concept of U5.0 offers the potential to substantially improve higher education quality by fostering greater accessibility and flexibility in learning, enabling the personalization of learning experiences, the integration of technology, the development of essential 21st-century skills, and the enhancement of assessment and feedback mechanisms [23, 36]. The quality management systems of HEIs are underpinned by eleven fundamental principles: encompassing a focus on learners and other beneficiaries, visionary leadership, engagement of people, process approach, improvement, evidence-based decisions, relationship management, social responsibility, accessibility and equity, ethical conduct in education, and data security and protection. Universities must actively promote continuous improvement, particularly in ways that lead to positive change. To achieve this, establishing mechanisms for the ongoing systematic collection of feedback from stakeholders is crucial, including gathering data from students and lecturers on their perceptions of education quality, current issues, and potential solutions [36, 37]. Decision-making processes should be evidence-based, facilitating the demonstration of compliance with quality standards and providing a foundation for new policies and practices. The quality of professional exposure is a significant aspect, as the digital transformation spurred by Industry 4.0 and 5.0 necessitates the development of relevant competencies, skills, and work ethics, with the United Nations SDGs and European values supporting business ethics being integrated into modern quality management systems. Ultimately, data, processes, and people within HEIs should collaboratively work towards enhancing overall quality [37].

The distinctiveness of a HEI's educational program stems from its competitive advantages. Quality educational components, competencies, innovation, interdisciplinarity, and originality are crucial elements. Educational programs are instrumental in establishing a HEI's leadership, brand, and niche in the labor and educational services markets. External quality evaluations and accreditations contribute to the overall image of the HEI. Effective program delivery necessitates quality management systems, a positive academic atmosphere, and a blend of established traditions and innovative approaches [38].

Instructional quality is a crucial characteristic for evaluating the effectiveness of teaching and learning within educational systems. The fundamental objective of U5.0 is to foster personalized learning, encourage collaborative practices, and promote overall well-being through the integration of digital tools such as virtual reality and IoTs [39]. The implementation of personalized learning demands substantial changes within the classroom and is influenced by teachers' attributes and their preparedness for educational transformation. Experienced educators and those benefiting from quality professional development programs with a strong understanding of pedagogical principles may be better equipped to implement personalized learning effectively. Technology-supported personalized learning (TSPL) has emerged as a transformative approach in education, focusing on individual student needs, and could positively impact the overall instructional quality [40].

The integration of the Internet of Things (IoT) in smart universities introduces unique data security challenges, especially with unsupervised devices in less monitored areas. Educational institutions are vulnerable to both physical and cyber-attacks due to open-access environments and a lack of awareness among students regarding cyber threats. To preserve their reputation and the confidence of students, parents, and alumni, these institutions must invest in comprehensive security measures across the entire campus. The confluence of increased online dependency and the proliferation of IoT devices underscores the imperative for HEIs to prioritize and strengthen their cybersecurity posture and user education initiatives [41].

The increasing number of interconnected smart devices and equipment in smart universities presents a significant vulnerability that attackers can exploit as entry points into the network, thereby affecting the overall security of the institution. Furthermore, the distribution and processing of data from sensors through multiple systems increases the risk of tampering or unauthorized alteration. The complexity of these networks and the inherent vulnerabilities of IoT devices also complicate network management and monitoring. Human factors, such as error, lack of skilled cybersecurity personnel, ongoing training, and a robust security strategy, further exacerbate these technical vulnerabilities, making systems more susceptible to attacks. Attackers can leverage these weaknesses to gain access to systems, retrieve confidential data, control operational systems, and target specific wireless communications [42].

Integrating security from the initial design and deployment of IoT devices and smart applications is paramount for ensuring adequate cybersecurity. Various security measures can be implemented, including access controls to regulate resource access, authentication to verify users and devices, and encryption for secure, low-power communication. Furthermore, trust management can eliminate malicious nodes, and secure routing protocols to enhance network integrity. Regular security patches and updates, physical security measures, and intrusion detection systems, like firewalls and antivirus software, are also essential. Finally, blockchain technology offers a means to manage large data volumes, secure IoT devices, protect user privacy, and ensure trust, confidentiality, and integrity [41].

U5.0 emphasizes preventative cybersecurity measures also through personalized training tailored to individual student needs using simulations and adaptive platforms. Students gain practical experience via hands-on exercises and collaborative group projects focused on real-world cybersecurity challenges. Addressing the trend of remote work and cloud migration, curricula must incorporate skills in cloud database exploration and the ethical handling of sensitive data. Furthermore, integrating workshops on privacy and data protection is crucial for developing students' critical thinking skills in tackling cybersecurity issues and achieving digital literacy [31].

5 Conclusion

In conclusion, this study has mapped the state-of-the-art of the University 5.0 concept, addressing its main characteristics, potential impacts, and implementation challenges through a comprehensive literature review. The findings highlight that U5.0

represents a significant paradigm shift for HEIs, transforming them into hubs of social and digital innovation with a strong emphasis on creating supportive structures, integrating interdisciplinary approaches, and promoting cross-sector collaboration. This evolution is crucial for HEIs to adapt to rapid societal transformations and prepare graduates for the demands of the fourth and fifth industrial revolutions.

HEIs are urged to cultivate a sustainability-focused culture through eco-conscious practices and curricula addressing climate change. They should also prioritize student-centered learning, ethical considerations, and social awareness, while thoughtfully integrating technology to enhance education. Universities are evolving into socially and digitally engaged entities within innovative ecosystems, fostering collaboration and knowledge sharing.

Ultimately, the successful transition to U5.0 requires HEIs to embrace a holistic and strategic approach, fostering a culture of sustainability, prioritizing student-centered learning, leveraging digital technologies effectively, ensuring robust cybersecurity, and promoting collaboration within the broader innovation ecosystem. This necessitates a balanced approach to technological integration and a commitment to sustainability and collaborative innovation in HEIs.

The study is limited by the databases referenced and by the consideration of articles written only in English. Therefore, further studies are necessary also to analyze the practical implementation of a U5.0 approach and verify the realistic impacts that emerge. This study provides valuable insights for university practitioners, managers, and policymakers seeking to comprehend and incorporate the U5.0 paradigm into their strategic goals, thereby contributing to a more innovative, sustainable, and socially responsible future for higher education.

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