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CONNECTING VIETNAM'S HIGHER EDUCATION TO IR 4.0: THE NETWORKED LEARNING ECOSYSTEM PERSPECTIVE

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Abstract

The Networked Learning Ecosystem holds the key to aligning Vietnam's higher education with the Fourth Industrial Revolution (IR 4.0). This paper explores the multifaceted aspects of this ecosystem, from digital infrastructure to global engagement, and how they collectively reshape the educational landscape. By emphasizing ethical practices, digital equity, and quality assurance, this research envisions a future where Vietnam's higher education institutions become pioneers in IR 4.0 readiness. Through a detailed examination of implementation strategies and expected outcomes, this study offers a roadmap for a connected, adaptive, and globally competitive higher education system in Vietnam.

Keywords: Networked Learning Ecosystem, Higher Education, Fourth Industrial Revolution (IR 4.0), Digital Infrastructure, Technology Integration, Educational Transformation, Innovation in Education.

1. INTRODUCTION

The Fourth Industrial Revolution (IR 4.0) stands as a testament to the profound transformation of societies, economies, and industries worldwide [1]. It heralds an era characterized by unprecedented technological advancements, the fusion of digital and physical realms, and the redefinition of traditional paradigms. At the heart of this transformative wave lies higher education - a sector uniquely positioned to both shape and respond to the demands of the digital age. Within this global context, Vietnam, a nation of rich history and vibrant culture, stands as a beacon of progress and ambition. Emerging as one of the fastest-growing economies in Southeast Asia, Vietnam envisions a future deeply intertwined with the opportunities and challenges of IR 4.0 [2]. Yet, at the core of this vision is a profound question: How can Vietnam's higher education system not only adapt to the sweeping changes brought forth by IR 4.0 but also become a catalyst for innovation, economic growth, and societal development?

This paper embarks on a transformative journey—one that seeks to bridge the gap between Vietnam's higher education and the dynamic landscape of IR 4.0. At its heart lies the concept of a "Networked Learning Ecosystem," a visionary framework that integrates digital infrastructure, innovative pedagogical approaches, ethical considerations, and strategic technology adoption [3]. Through this ecosystem, we propose a holistic perspective to revitalize and reshape Vietnam's higher education landscape, aligning it with the imperatives of IR 4.0.

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2. BACKGROUND

The term fourth industrial revolution (IR 4.0) was originally invented and introduced during the Hannover Trade Fair in Germany in 2011 by three engineers: Henning Kagermann, Wolfgang Wahlster, and Wolf-Dieter Lukas. Kagermann\et al.described the concept of Industry 4.0 as the technical integration of cyberphysical systems (CPS) into manufacturing and Services. These CPS comprise smart machines, storage systems, and production facilities capable of autonomously exchanging information, triggering actions, and controlling each other independently. This will have implications for value creation, business models, downstream services, and work organization. In 2016, the World Economic Forum (WEF) referred to IR 4.0 as the convergence of technologies so that the line between the physical and digital spheres becomes indistinct. Artificial intelligence (AI) and robotics, the Internet of things, additive manufacturing, neurotechnologies, biotechnologies, and virtual and augmented reality are identified as some of the key technological drivers of IR 4.0 [4]

According to Amela (2023) [4], worldwide, many countries are preparing for entering the new era, and higher education (HE) has a leading role in shaping the transitions necessary to adjust to the automation economy carried by IR 4.0. While the shifting toward digitization holds great promise, it also poses major challenges in the reformation of HE that requires strategic planning to comply with the upcoming changes. Such transformation imposes identifying a set of transferable skills that will prepare all students, regardless of their discipline or professional field, for working in the future. These skills often involve competencies related to innovation, problem solving, digital literacy, and lifelong learning. The need for such skills is inescapable in confronting major challenges facing the world that cannot be addressed by the traditional education system designed to meet the needs of past industrial revolutions.

Perhaps, the next era is more about *what* students can do with their knowledge after leaving the university than *how much* knowledge has they obtained.

While Industry 4.0 is still evolving, professionals involved in education must embrace this transformation through high-quality learning - “Education 4.0.” Miranda et al. defined Education 4.0 as the implementation of new learning methods, novel pedagogic and managerial tools, as well as smart and sustainable infrastructure in HE institutions, which is primarily supplemented by new and developing technologies. Combining these resources will enable the students to obtain the desirable critical competencies needed for future work. The diagram in Fig. 1 compiles the relevant concepts of the higher education transition from Education 1.0 to the current industrial and educational paradigm of Education 4.0 [5].

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Period	Late 18th Century	Early 20th Century	Late 20th Century	Present
Philosophy	Essentialism, behaviorism, and instructivism	Andragogical, constructivist	Heutagogical, connectivist	Heutagogical, peeragogical and cybergogical
Educator role	Sage	Guide, information source	Orchestrator, curator and collaborator	Mentor, coach, collaborator, reference
Student role	Largely passive	Emerging active "owning of the knowledge"	Active, "Knowledge ownership", initial independence	Active, high independence, trajectory designer
Approach	Teacher-centered	Peer assessment encouraged, high teacher importance	Co-constructed, first student-centered	Mostly student-centered
Learning outcome	Grades, graduation degree	License to professional practicing	Prepared for practice and scenario analysis	Training of key competencies both soft and hard
Enablers	Mechanical printing, graphite pencil, ballpoint pen, typewriter	First computers, electronic devices and calculators	Computers and widespread use of the internet	ICTs tools and platforms powered by IoT
Information source	Standard texts	Adopted texts and open-source material (physical)	Texts, case studies, second hand experience	Based on online sources
Facilities	Universities / classrooms	Blended laboratories and classrooms	Blended and flexible physical shared spaces	Cyber and physical spaces both shared and individual
Industrial technology	Mechanical systems, steam powered	Mass production, industrialization and electricity	Internet access, automatization and control	Connectivity, digitalization and virtualization

Fig 1: Summary of the transition from Education 1.0 to Education 4.0 [5]

In the context of Vietnam, a country with a rich history and a dynamic economy, the imperative to align HE with the demands of IR 4.0 is particularly salient. Vietnam's remarkable economic growth and commitment to education have positioned it as one of the most promising emerging markets in Southeast Asia (World Bank, 2021) [2]. Yet, the nation's higher education sector grapples with the dual challenge of expansion and quality enhancement, coupled with the urgent need to equip students with the skills and competencies demanded by IR 4.0.

According to Chigbu et al (2023) [6], A learning ecosystem framework (LE) involves pedagogical requirements formed by a wide range of stakeholders working toward the same goal – "student-centered learning," as depicted in Fig. 2 below.

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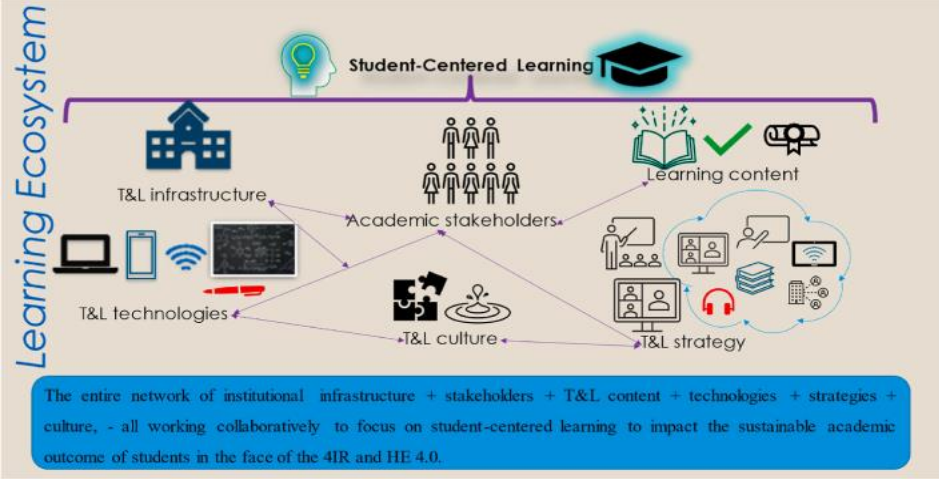

Fig 2: Shows the connected learning ecosystem that influences student-centered learning [6]

In conclusion, the primary reason for the institution's existence is to facilitate student learning. Consequently, students are dependent on and influenced by the learning ecosystem, which includes instructors. Students are the most critical stakeholders in education because they need a quality education to acquire the information and skills necessary for job success. As stakeholders in education, instructors are vested in ensuring students' learning; however, to ensure student-centered learning, teachers must take personal responsibility for determining the teaching strategy for their students to learn the curriculum materials most effectively. Nonetheless, instructors rely on the administrative staff and policymakers in the learning environment to ensure that the necessary resources for various T (teaching) &L (learning) methodologies are readily available for adoption and implementation. Consequently, university institutional staff members have a vested interest in the success of the educational environment by ensuring that all administrative responsibilities are carried out effectively and with a focus on the success of students learning. In addition, policymakers play a crucial role in the education environment. Their decisions determine the implementation of every system component, including teaching methods, culture, curricular content, university infrastructure investment, innovation, and the quality of students' academic achievement. All learning ecosystem stakeholders generally have relational ties that pursue student-centered learning and students learning sustainability.

3. LITERATURE REVIEW

The intersection of HE and the IR 4.0 is a topic of paramount significance in the contemporary academic discourse. With the rapid evolution of technology and the digitalization of nearly every aspect of life, the role of HE institutions (HEIs) in preparing graduates for IR 4.0 has come under intense scrutiny. This literature review delves into key themes and insights that contextualize the conceptual framework of the Networked Learning Ecosystem within the context of Vietnam's higher education landscape.

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3.1 Supply-demand perspectives

The students, educational institutions, and industries are the primary stakeholders in this situation, and their collaboration is crucial to ensure that academic programs meet the demands and needs of the industry. As shown in Fig. 3 [7], it serves as an integrative framework for sustainable human resource development by linking supply and demand stakeholders with the several system components. The interconnections between these stakeholders and the four components address and harmonize human resource development at the organizational, regional, and national levels. Additionally, skill development facilitates meeting stakeholder's supply (educational institution) and demand needs (industry), enhances knowledge acquisition, and promotes continuous innovation.

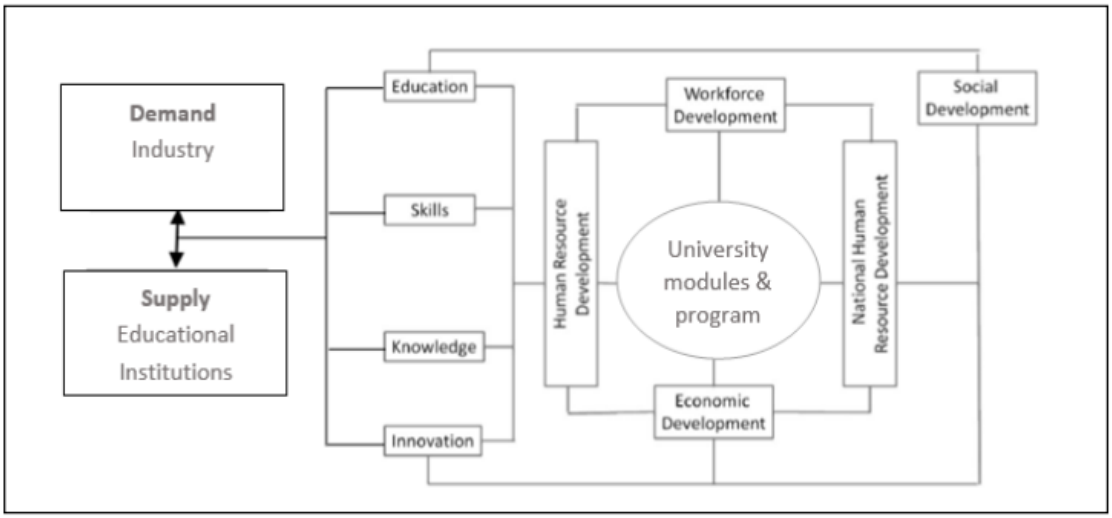

Fig 3: Integrative framework for supply and demands stakeholder linking the nontechnical university system components. [7]

According to Yamada et al (2018) [8], the mismatch issue happens due to limited interaction between the supply and demand stakeholders. As noted by Ibrahim & Nashir (2022) [9], previous literature postulates various causes of supply and demand imbalances. According to [7], the Malaysia Education Blueprint 2015 - 2025 report stated that graduates also need transferrable skills like critical and creative thinking and problem-solving abilities. Although both perspectives have identified relevant skills for the IR4.0 environment, the main challenge is to align or to match the supply and demand perspectives. Past studies often focused only on one angle (either the supply or demand side). Therefore, the present study aims to gather perspectives from both industry players' demand and universities' supply side.

3.2 Education 4.0 in HE perspectives

According to Miranda et al (2023) [5], Education 4.0 is the current period in which HEIs apply new learning methods, innovative didactic and management tools, and smart and sustainable infrastructure mainly complemented by new and emerging ICTs to improve knowledge generation and information transfer processes. Combining these resources during teaching

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learning processes will support the training and development of desirable critical competencies in today's students. In their research, the authors propose four core components that shape the proposed concept of Education 4.0. These components are (i) *Competencies* (training and development of desirable critical competencies in today's students), (ii) *Learning Methods* (incorporation of new learning methods), (iii) *Information and Communication Technologies (ICTs)* (implementation of current and emerging ICTs), and (iv) *Infrastructure* (use of innovative facilities, services, and systems to improve learning processes Fig 4 summarizes the concept of Education 4.0 and its four core components. This figure also shows relevant examples of implementations of the proposed components.

Requirements of the labour market and the attitude of young generation towards education system make the traditional form of higher education offered by HEIs insufficient. New challenges require a new form of acting. These challenges can be considered from different points of view, which can be shortly represented as Who, What, and How. The first perspective (*Who*) refers to stakeholders, both people and organizations, participating in the educational process. It covers their needs, requirements, capabilities, and motivations - generally all aspects influencing their attitudes towards education.

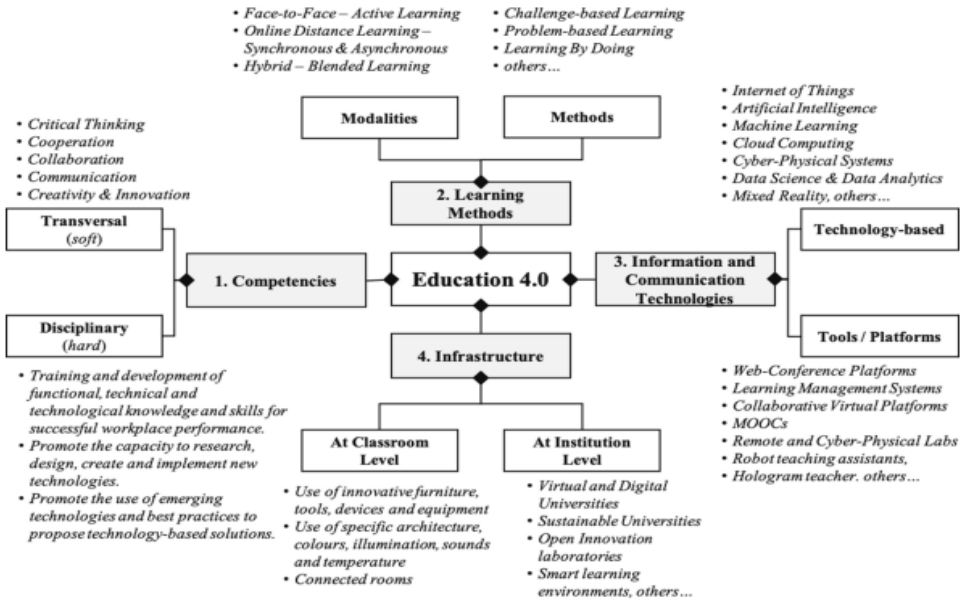

Fig 4: The four core components of Education 4.0 in higher education used as a reference framework. [5]

The second perspective (*What*) refers to the problems related to the educational content: scope and form. The process of its development, in most cases is the internal process of a given HEI, but it is under impact of many internal (e.g., capabilities, staff availability) and external (e.g., labour market needs, students' expectations) factors. The third perspective (*How*) represents the way of interaction between Who and What, in particular, describing the newly developed and introduced forms and methods used in the educational process (Fig 5) [10].

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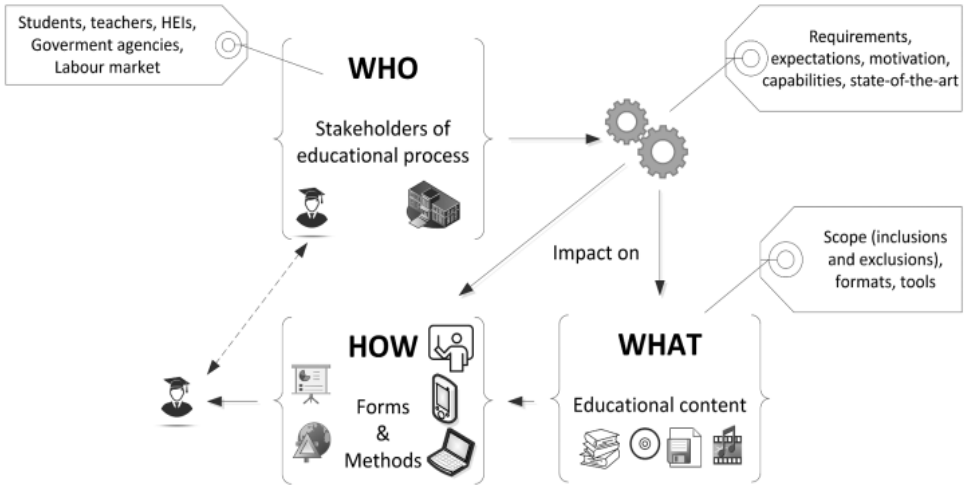

Fig 5: Perspectives of the HE teaching process. [10]

4. DISCUSSION

The discussion of connecting Vietnam's higher education to the Fourth Industrial Revolution (IR 4.0) through the lens of the Networked Learning Ecosystem brings to light a series of critical insights, challenges, and opportunities. In this section, we delve into key points that underscore the significance of this transformative endeavor.

4.1. Transforming Higher Education for IR 4.0: The Imperative

The IR 4.0 is an epochal shift that demands profound changes in higher education. The imperative for Vietnam's HEIs to connect with IR 4.0 is driven by the need to prepare graduates for an increasingly digital workforce (World Economic Forum, 2022). Traditional modes of education are no longer sufficient; HEIs must become hubs of innovation, adaptability, and lifelong learning.

4.2. The Networked Learning Ecosystem: A Holistic Approach

The Networked Learning Ecosystem emerges as a visionary framework that offers a holistic approach to connect Vietnam's higher education to IR 4.0. By integrating digital infrastructure, innovative pedagogical paradigms, ethical considerations, and strategic technology adoption, this ecosystem paves the way for transformative change.

4.3. Components of the Networked Learning Ecosystem

Exploring the components of the Networked Learning Ecosystem reveals its depth and breadth. It encompasses digital infrastructure, including high-speed internet access and state-of-the-art learning platforms, to connect students and educators. Innovative pedagogical strategies, such as flipped classrooms, collaborative online projects, and experiential learning, foster adaptability and critical thinking. Ethical considerations emphasize data privacy, security, and equitable access to learning resources.

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4.4. Strategies for Implementation

Implementing the Networked Learning Ecosystem within Vietnam's higher education landscape requires careful planning and execution. Faculty development programs are essential to equip educators with digital pedagogical skills and a growth mindset. Collaborations with industry partners can bridge the gap between academia and the workforce, ensuring that curricula remain relevant.

4.5. Ethical Considerations and Digital Equity

Connecting Vietnam's higher education to IR 4.0 through technology demands ethical considerations. Data privacy, security, and the responsible use of technology are paramount. Additionally, efforts must be made to address digital equity, ensuring that all students have equal access to digital resources and opportunities.

4. 6. Governance and Leadership

Effective governance structures and visionary leadership are essential for the successful implementation of the Networked Learning Ecosystem. These structures should enable agile decision-making, encourage innovation, and ensure that the ecosystem remains aligned with the evolving demands of IR 4.0.

4.7. Anticipated Impact

While the journey of connecting Vietnam's higher education to IR 4.0 through the Networked Learning Ecosystem may be challenging, the anticipated impact is transformative. Graduates will emerge not only with specialized knowledge but also with the ability to adapt, innovate, and engage in lifelong learning (World Economic Forum, 2022). Vietnam's HEIs will become dynamic hubs of education, research, and societal impact.

4. 8. Global Relevance

The Networked Learning Ecosystem is not confined to Vietnam; it holds global relevance. As nations across the world grapple with the challenges and opportunities of IR 4.0, the principles and strategies outlined in this paper can serve as a blueprint for higher education transformation in diverse contexts. In conclusion, connecting Vietnam's higher education to IR 4.0 through the Networked Learning Ecosystem represents a visionary and imperative endeavor.

It requires a multi-faceted approach, ethical considerations, and strategic leadership. The impact of this transformation is far-reaching, shaping not only the future of Vietnam's higher education but also contributing to the global dialogue on education in the digital age.

This discussion section synthesizes the key points and implications of connecting Vietnam's higher education to IR 4.0 through the Networked Learning Ecosystem. It underscores the significance of this endeavor and its potential to shape the future of higher education in Vietnam and beyond.

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5. CONCLUSION

In summary, this research working makes substantial contributions by offering a comprehensive framework, practical insights, ethical considerations, and a vision for higher education's role in the digital age. It envisions a future where education becomes not just adaptive but truly transformative, with the potential to reshape both higher education and society at large. In conclusion, the imperative to connect Vietnam's higher education to IR 4.0 is a call to action - a call for visionary leadership, ethical stewardship, and a commitment to transformative change. The Networked Learning Ecosystem provides a framework to embark on this journey, one that transcends borders and holds the promise of shaping a future where higher education is not just adaptive but transformative. The journey ahead is filled with challenges, but it is also brimming with opportunities to redefine education, empower learners, and contribute to a thriving society in the digital age. As Vietnam's higher education institutions embark on this transformative path, they take a significant stride towards a future where education truly prepares individuals for the challenges and opportunities of the Fourth Industrial Revolution.

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