Enhancing the quality of digital human resource training in higher education in Vietnam

M.A. Vo Thi Kim Xuan
Vinh Long University of Technology Education
M.A. Nguyen Thanh Nguyen
Dong Thap University

Abstract: ***The rapid advancement of digital technology, spurred by the Fourth Industrial Revolution, has profoundly influenced various aspects of socio-economic life, including education and training. Consequently, educational institutions are confronted with the imperative to adapt to these changes. In response, many universities have undertaken significant efforts to modernize their training methodologies, encompassing curriculum updates and pedagogical innovations. However, despite these endeavors, integrating digital technology-related content, such as electronic data and e-commerce, poses considerable challenges for higher education in Vietnam. This article examines the essential characteristics of the digital workforce and identifies the obstacles encountered in training digital human resources within Vietnam's educational framework. Also, the article proposes robust strategies to foster innovation in higher education, primarily focusing on enhancing the quality of digital human resource training in the country.***

Keywords: *Higher education; education 4.0; quality enhancement; digital human resource; training; Vietnam.*

1. Introduction

Currently, human resources are approached from various perspectives. However, they are generally perceived as individuals' aggregate quantity and caliber, amalgamating criteria such as cognitive acumen, physical prowess, and moral attributes, collectively constituting each individual's capacity mobilized for productive labor in societal advancement and progress. Each stage of socio-economic development requires a corresponding level of productive forces, especially human resources. Thus, cultivating a digital workforce is imperative for its implementation, organization, and operation, which are congruent with the envisioned digital economy and society. In essence, the digital workforce serves as the linchpin for catalyzing the functioning of the digital economy and society.

The digital workforce can be understood as the total quantity and

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quality of people, encompassing intellectual capacity, physical strength, and ethical qualities that create each person's abilities when engaged in labor and creative endeavors.

In today's world, people live in an environment surrounded by digital technology. The application of technology in all aspects of social life has brought experiences, habits, and behaviors related to new technologies into the work processes of organizations and businesses. Notably, the workforce in organizations and enterprises is deeply affected as job positions continuously evolve, and social media and digital technology strongly influence the operation of agencies, organizations, and enterprises.

Vietnam is progressively promulgating and enacting specific policies to propel digital transformation forward comprehensively. This is evidenced by the "National Digital Transformation Program until 2025, vision to 2030," ratified by the Prime Minister through Decision No. 749/QD-TTg dated June 3, 2020, which delineates critical targets by 2025, notably ensuring 80% of online public services are at level 4; achieving 100% digitization of government reporting; positioning Vietnam among the top 70 countries in e-government, among others. The national digital transformation program also identifies education as one of the eight priority areas for implementation to strive to make Vietnam one of the leading countries in digital transformation within education and training. To achieve this goal, developing digital human resources emerges as a pivotal and imperative endeavor (Prime Minister, 2020).

2. Essential characteristics of digital human resources

Suppose the essence of the digital economy is an economy developed based on digital technology applications and built on a knowledge foundation, where the role of knowledge is considered a resource for economic development. In that case, digital human resources must be rigorously trained, proficient in their expertise, ethically sound, capable of mastering technology, creative, and adaptable to technological changes in the economic and social spheres. Digital human resources must demonstrate some essential characteristics as follows:

First, digital human resources can master digital technology devices.

Agencies, organizations, and enterprises must retain from standing aside from the Fourth Industrial Revolution; therefore, they must invest money to purchase machinery, equipment, or modern production lines and technologies when needed. However, to operate these modern technologies and equipment, a workforce with sufficient expertise to access new equipment and possess a high level of technological knowledge to master these new machines, equipment, and technologies. In other words, laborers must master digital devices during interaction to turn technology into an "extended arm" to carry out tasks quickly and efficiently. Incredibly, technologies that are changing the world's production, such as artificial intelligence, self-driving cars, extensive data analysis and cloud computing, 3D printing technology, the Internet of Things and connected devices, robots, and social networks, are being researched and applied by businesses in Vietnam. Thus, preparing a labor force to master digital technology devices in emerging industries is highly urgent.

Second, digital human resources can quickly adapt to the digital environment and new scientific and technological advancements.

With the current development of the Fourth Industrial Revolution, industry structure shifts rapidly; many professions will disappear or reduce the workforce, while many new professions will emerge, or some industries will demand higher qualifications and skills from laborers. To adapt quickly to these changes, basic knowledge of computer

science, application of technology, exploitation of digital databases, etc., is necessary for everyone and every profession. In the digital transformation era, with the widespread use of digital technologies in the coming years, almost all laborers must understand and be familiar with numbers and data, as well as use computers and data analysis tools created on computers to exploit and apply them in work processing. A survey report on the capacity of young people in the digital age shows that employers' demand for digital skills has increased by 200% over the past three years. In the next five years, this figure is forecasted to rise rapidly (Change & Huynh, 2016).

According to the Ministry of Industry and Trade's survey on the readiness to apply Industry 4.0 technologies in industrial enterprises' production and business activities, up to 82% of enterprises are in the initial stage. Among them, 61% are still outside the game, and 21% of businesses have started initial preparation activities. Although the Industrial sector has some pioneering enterprises (in areas such as oil, gas, and electricity) prepared to cope with technological changes, 16 out of 17 surveyed priority sectors still need higher readiness levels (Ha, 2018). This shows that a workforce must still be ready to adapt to new scientific and technological advancements.

Third, digital human resources have disciplined and ethical professional behaviors.

This characteristic is always necessary at all countries' socio-economic development stages. However, in this stage, the disciplined and ethical professional behaviors of digital human resources must be placed in the context of a digital environment, which reflects the interaction between humans and modern machinery and technology at all times, everywhere, in every job or profession. Business ethics and corporate social responsibility need to be ensured - it is a commitment to spirit, ethics, and culture towards families, local communities, society as a whole, and the environment. Especially in the current digital transformation phase, business activities in the digital environment are becoming more prevalent, so complying with business ethics requirements becomes increasingly necessary to ensure consumer rights and maintain social order.

Fourth, digital human resources can innovate and think creatively in their work.

They are people who can develop new methods and approaches to perform tasks, solve problems, and overcome challenges. This will help their work and the work of agencies, organizations, and enterprises operate more efficiently. Only some people are born with creative thinking skills and dare to change working methods in new directions instead of following traditional methods. To do this, they must undergo a training and development process. Creative thinking and breakthrough thinking skills are enhanced even more through working and interacting with the digital environment, with intelligent equipment, machines, and technologies that can replace humans in some jobs. In the process, it will stimulate them to explore and innovate to succeed. Therefore, digital human resources must be properly and continuously trained and supplemented.

Fifth, digital human resources can ensure information security when interacting in the digital environment.

Alongside applying digital technology to exploit information and data for life or work, ensuring the security of personal, customer, and organizational information is the top concern when interacting in the digital environment. Therefore, laborers, when working in the digital environment, must have the capability to ensure information security to avoid risks such as database loss, leakage of personal information, or organizational information.

3. Challenges in training digital human resources for higher education in Vietnam

As of the end of 2020, Vietnam has a population of approximately 97.6 million. Among them, the labor force is estimated at 48.3 million people, a decrease of 849.5 thousand people compared to 2019; the proportion of trained labor with degrees or certificates from elementary level upwards is 24.1%, which is 1.3 percentage points higher than in 2019 (Tran et al., 2016). Abundant human resources and improving quality are considered Vietnam's strengths in the era of Industry 4.0. However, alongside the training of skilled human resources, especially digital ones, to meet the current and future labor market demands, there are still many limitations. Therefore, higher education is facing numerous changes and challenges.

Firstly, rapid structural shifts in professions compared to university training programs: According to the World Economic Forum's 2018 report on readiness for future production, Vietnam is among the countries not fully prepared for the 4.0 industrial revolution, ranking 70th out of 100 in terms of the workforce (Chu et al., 2021). Compared to other Southeast Asian countries in terms of workforce index, Vietnam ranks behind Malaysia, Thailand, and the Philippines and is similar to Cambodia. The International Labour Organization (ILO) also identifies Vietnam as the most affected country in ASEAN regarding labor due to digital transformation, with 70% of workers in primary industries affected. In addition to traditional technology companies, many rapidly growing companies in new fields, such as Fintech, Edtech, and Meditech, lead to an increased demand for IT personnel from tourism, banking, and retail industries. In recent years, the demand for IT personnel has increased, but the IT labor market in Vietnam has always needed more supply in terms of quantity and quality. Specifically, in 2019, the number of IT personnel needed was 350,000, but there was a shortage of about 90,000. In 2020, the estimated number of IT personnel needed was around 400,000, with an estimated shortage of 100,000 personnel; in 2021, the need is for 500,000 personnel, with a projected shortage of 190,000 (Thu Hang, 2021). Meanwhile, training institutions need to be faster to change regarding training programs, management methods, teaching methods, evaluation, and scientific research, thus failing to produce a workforce that meets the demands of the digital labor market in quantity and quality.

Secondly, changes in the labor market and economic structure pose challenges for university programs: The labor market requires workers in every industry and profession to have the necessary skills, attitudes, and qualifications to meet practical societal changes. Although universities are striving to integrate the "breath" of businesses and the changing economic structure into their curricula and scientific research to enhance the practicality of their training programs and meet the demands of the labor market in the context of digital transformation in enterprises and digital economic development, they have yet to satisfy the strict requirements of the labor market fully.

According to the ILO's assessment, despite many job cuts in various sectors due to the impact of the Covid-19 pandemic, information technology-related sectors are still "thirsty" for workforce. Jobs in the sector have "grown by up to 47% in recent years, but formal training institutions for information technology only meet about 40% of actual demand" (Tuyen Giao Magazine, 2021). Fields rich in potential, such as Mobile Games, Blockchain, IoT, and AI, still have many vacancies for the digital workforce. The question is whether they have the potential and opportunity to compete equally in the global labor market. Therefore, the task of university education is to fill these gaps.

Thirdly, the 4.0 industrial revolution's impact on university education models and management: In terms of university management, this involves leveraging powerful information technology to digitize management information, create interconnected large databases, deploy online public services, apply AI, Blockchain, data analysis, etc., for fast, accurate decision-making. In teaching and learning activities, assessment, evaluation, and scientific research, the use of information technology for digitizing materials (e-textbooks, e-lectures, E-Learning lecture banks, quiz question banks), digital libraries, virtual laboratories, deploying online training systems, and building cyber universities are essential. However, this requires universities to have competent personnel to operate and efficiently utilize database systems for university management. Additionally, there is a need for a team of lecturers to ensure both quantity and quality in implementing training programs and adopting new teaching methods on digital platforms to guide students in familiarizing themselves and enhancing their interaction skills in digital environments.

Fourthly, investment in competitiveness and ranking enhancement: Vietnamese education faces competition pressure from regional and Asian institutions. The cross-border labor market also affects Vietnam's labor market and human resources. With the emergence of multinational companies from various countries and territories, labor migration, especially skilled labor, between countries, within and outside the region, is common. They may sit in one place but manage systems globally. Alternatively, online sales teams must master Digital Sales, E-Marketing, and E-Commerce solutions to sell globally. This raises the question of whether young graduates have the potential and opportunities to compete equally in the global labor market. Therefore, the task of university education is to fill these gaps.

Fifthly, information security concerns in the digital environment: In the context of rapid scientific progress and the ongoing digital transformation in the era of the 4.0 industrial revolution, training human resources needs to innovate both in terms of models and structures, shifting from the mindset of learning once for a lifetime to lifelong learning. Therefore, the issue of training and retraining for the workforce remains a problem that needs prompt and satisfying solutions to ensure a workforce that can meet the rapid changes and strict demands of the labor market. Hand in hand with the transition from the traditional economy to the digital economy in our country is the process of restructuring the workforce in the economy, with digital personnel playing a dominant role in the total social labor force. This demonstrates that the process of innovating higher education must continue vigorously with breakthrough and synchronized solutions shortly.

In the context of rapid scientific advancements and the gradual implementation of digital transformation on the foundation of the Fourth Industrial Revolution, workforce training needs to innovate both in its model and structure. The shift must be made from a mindset of learning once-in-a-lifetime jobs to a state of lifelong learning to remain employable throughout one's career. Therefore, the issue of training and retraining for workers remains a problem that needs a prompt and satisfactory solution to ensure a workforce that continuously meets the labor market's rapidly changing and demanding requirements. Accompanying the transformation of our economy into a digital economy is the process of shifting the labor structure within the economy, where the digital workforce increasingly takes on a leading role in the total labor force. This shows that the renewal of higher education must continue to be implemented more decisively with breakthrough and synchronized solutions shortly.

4. Some solutions for innovating higher education to enhance the quality of digital workforce training in Vietnam

Vietnam, with a population of approximately 97.6 million, holds significant advantages in terms of human resources, which is crucial for socio-economic development. However, to enhance the economy's competitiveness, ensure the operation of digital government, digital economy, and digital society, and address challenges and difficulties in higher education, as mentioned above, the widespread training of digital human resources in all fields and sectors is imperative. In the era of the digital economy, digital skills have become a necessity for all industries, making the development of digital human resources a top priority. Training policies and the development of digital human resources need to expand in scale, diversify forms, and improve the quality of training while providing favorable conditions and a conducive working environment for effectively utilizing trained human resources, ensuring that individuals maximize their capabilities and have opportunities for continuous learning and skill enhancement.

Firstly, innovating training programs and assessment methods: Based on Document No. 5444/BGDĐT-GDĐH dated November 16, 2017, from the Ministry of Education and Training on the application of specialized training mechanisms for information technology-related fields at the university level, universities and colleges need to innovate and expand the training framework to focus on new training codes in the field of information technology, including computer science, computer networks and data communication, software engineering, information systems, information security, etc. They should also encourage the design of priority training programs for science and engineering fields, multi-disciplinary training, and increasing the duration of training for knowledge, skills, and interactions in digital environments and applications. Assessment methods need to transition from traditional paper-based exams to open-book exams or computer-based assessments through digital applications.This requires students to approach and practice basic information technology applications, improve their soft skills, and develop systematic thinking. This should be based on guidance from lecturers, self-study, and self-research, without relying entirely on the knowledge acquired in the classroom.

Secondly, enhancing skills training for students: The reality indicates a skills shortage among Vietnamese workers, including mandatory and soft skills. To develop high-quality digital human resources, proficiency in foreign languages and digital skills are fundamental. Emotional intelligence (EQ), intelligence quotient (IQ), spiritual intelligence (SQ), and physical intelligence (PQ) are essential for critical thinking and problem-solving and, therefore, should be emphasized in education. Universities need to enhance skills training by incorporating clear learning outcomes into their programs, emphasizing the practical application of skills depending on the field of study, and increasing the time spent on practical learning and research.

Thirdly, strengthening collaboration between universities and businesses through "enterprise semesters": Universities, play a crucial role in the proposed solutions as the primary source of skilled workforce. To ensure that knowledge gained is not purely theoretical, effective learning occurs when students can practise in real-world environments. Universities should proactively collaborate with businesses to implement strategies for nurturing human resources from the first year and facilitating flexible

employment arrangements through "enterprise semesters". New training programs should be developed and evaluated with input from industry experts to ensure relevance to practical needs. Businesses can then specify their workforce requirements to universities to avoid situations of over- or under-skilled workers, especially in IT-related fields.

Fourthly, improving the quality of technology incubators within universities: To achieve this, more robust policies and support from the government are necessary. The government's role in establishing and developing innovative startup incubators within technology-focused universities is crucial, as it creates an ecosystem for innovative startups. Technology business incubation is still relatively new and challenging for many universities due to the low prevalence of technology businesses. However, with the government's support, developing technology business incubators in universities will promote scientific research among faculty and students, provide opportunities for students to engage with real-world problems, and ultimately enhance of workforce training's quality to meet societal demands.

Fifthly, reforming state management mechanisms for higher education and vocational training according to labor market demands: This includes focusing on several key areas, such as (1) researching and developing standards for minimum skill requirements in various industries and professions in line with practical needs at each stage; (2) encouraging and facilitating cooperation and mutual support between businesses and training institutions to improve skills for the workforce, prioritizing fields such as computer science, information technology, and telecommunications; (3) providing financial support for training costs for schools and vocational training centers based on demand or orders from businesses, based on the number of graduates meeting occupational standards or the number of graduates employed within a month of graduation.

Sixthly, developing applied research and entrepreneurship ecosystems: This involves connecting universities with other businesses, organizations, and agencies to conduct applied research projects, expert consulting, and organizing timely seminars and workshops to enhance student connectivity, provide information, and improve capabilities while still in school. Vietnam can learn from Singapore's policies to encourage innovation and attract international talent. Singapore invests approximately USD 5 billion annually in scientific research, technology, and innovation. Their motto is "R - I - E" for Research, Innovation, and Enterprise (Phong, 2021).

5. Conclusion

In the digital economy, upgrading or investing in technology and digital equipment can happen quickly (with only cost and consulting). However, training workers in the knowledge and skills needed to master technology and control robots requires long-term and continuous efforts to transform individuals, change mindsets, and enhance awareness. The task of higher education today is to prioritize training and equipping workers with the necessary skills, creative abilities, and the ability to adapt quickly to constantly changing technological environments, gradually developing a digital workforce to implement the national digital transformation strategy. Therefore, the urgent requirement is to quickly innovate higher education as well as vocational training on the digital platform so that the outputs can provide a "blanket coverage" of human resources in various fields and sectors, possessing sufficient capabilities to operate the digital government, develop the digital economy and society, and serve digital transformation in key sectors. At the same time, proactive preparation is needed to create knowledgeable, skilled, and well-trained human resources who can step into the global labor market.

In Vietnam, the potential for developing digital human resources is enormous, and the ability to train digital human resources for the economy and society within the university system is entirely achievable. However, to produce digital human resources capable of participating in the regional and global labor market, it is necessary to leverage factors for developing digital human resources, including: (1) the pivotal and leading role of the Government in establishing mechanisms, policies, and environments for the development of digital technology; (2) the central role of businesses in investment activities, transformation, and adaptation to digital technology in all production, business, and service activities; (3) the proactive design of training programs and content that are adaptive to the dynamics and changes of the labor market in the context of structural shifts in industries; (4) the necessity for each worker to proactively integrate, enhance their ability to master digital technologies, and quickly adapt to technological changes.

In this regard, the Government is pioneering in creating motivation and leading the training and development of digital human resources. In contrast, the education sector plays a crucial role in shaping and creating digital human resources to cover various industries and occupations that are gradually changing now and in the future.

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