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Impact of the Industrial Revolution 4.0 on Higher Education in Vietnam: Challenges and Opportunities

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Abstract--With a lofty goal and mission, it is the mission of "cultivating people". Higher education has an important role to play in the development of society. Education not only trains people with good knowledge and expertise but also trains people with good moral and physical qualities, effectively serving the socio-economic development associations of each country, each ethnic group. The industrial revolution 4.0 with its rapid development speed and profound impacts on all areas of the social life of each country, if left behind of this revolution, backward development is also inevitable. On the contrary, if you make good use of the advantages of this revolution, the opportunities are huge. In the digital era, higher education will change profoundly from the educational environment, the role of teachers and learners to teaching methods. Currently, not only Vietnam but also many countries around the world are facing the big challenge of a shortage of highly qualified, specialized, and skilled workers. Therefore, to renovate higher education to meet the requirements of the labor market, it is necessary to raise awareness and renew thinking on higher education development; renovating training programs and methods; applying technology to the teaching process; renew the model of linkage between universities and enterprises; improve the quality of teachers and administrators. This is also the development direction that Vietnam needs to prepare for incessant changes in the future.

Keywords---challenges, higher education, industrial revolution 4.0, opportunities, Vietnam.

Introduction

Human history has experienced 4 industrial revolutions: The first is associated with the introduction of the steam engine (in the early eighteenth century); the second is associated with the advent of electricity (at the end of the nineteenth century and the beginning of the twentieth century); the third is associated with the advent of computers (the 1960s); and the fourth is associated with the integration of many technologies, mainly information technology, biotechnology, and artificial intelligence. The term "industrial revolution 4.0" was first mentioned in Germany in 2011, and has now been widely used in many languages around the world. The achievements brought by the industrial revolutions are enormous, strongly promoting the development of human society. With scientific and technological advances, machines gradually replace human labor, form new production and business models, labor productivity is increasing, material wealth is created out more and more. Therefore, the living people's lives are increasingly enhanced; Thinking, way of life, and methods of social management have also changed in the direction of more and more science. Before near 200 years, Marx predicted: "The development of fixed capital is an indicator that popular social knowledge has been transformed to some extent into direct production forces" (Marx & Engels, 1995). Today, with the rapid development of information technology and its consequences, Marx's prediction has come true. The development history of manufacturing forces shows that every industrial revolution has created great leaps of material production both quantitatively and qualitatively. It has a wide impact on all fields, including education and training. According to the researchers, all elements of industrial revolution 4.0, from developed knowledge, technical progress, labor energy, amount of renovation, to changes in administrative structure - institutions, management - administration all have developed at an exponential rate. Accordingly, a country that wants to develop quickly, following the speed of advanced countries, must develop a strategy to implement industrial revolution 4.0.

The industrial revolution 4.0 is a combination of technologies, blurring the boundaries between the physical world, the digital world, and the biological world. These are the technologies of the internet of things, artificial intelligence, robotics, self-driving cars, three-dimensional printing, super-intelligent computers, smart factories, nanotechnology, biotechnology... This is the revolution. on smart manufacturing based on breakthrough achievements in various technology fields with the foundation of digital technology breakthroughs. The center of the 4.0 revolution in information technology and the internet of things (IoT), which not only helps people communicate with each other but also helps people communicate with machines and objects; and objects communicate with each other. It has a strong impact on all industries, creating products and services that enable human society to lead fuller, more prosperous lives. At the same time, it also has the potential to lead to inequality and unemployment when new technology will gradually replace human labor. The industrial revolution 4.0 creates development at an exponential rate, from factors such as knowledge,

technical progress, labor productivity, the amount of wealth created, to changes in the human capital structure of administrative - institutional, management - administration (Sánchez & Singh, 2018; Nguyen et al., 2014).

Industrial revolution 4.0 will create a drastic change in the allocation of production resources, production, and consumption methods thanks to the strong development of science and technology. The “automatic” manufacturing characteristic of the 3rd industrial revolution will soon transition to “smart” production, in which machines are connected to the internet and linked together through a system that can automatically manage the entire production process according to a predetermined plan. The new wave of technology with smart manufacturing will help technology evolve and lead to increased productivity. But to be able to apply "smart manufacturing" in practice is indispensable for high-quality human resources. Therefore, a country that wants to develop quickly and sustainably must develop a strategy for implementation, especially education and training. The task set for the education industry in our country is to have a specific orientation to adapt to the new era, to train good human resources, to meet the requirements of the modern labor market. Research questions:

- What are the opportunities and challenges for higher education in general and Vietnam in particular?
- What should be done to innovate higher education in the current Industrial Revolution 4.0 in Vietnam?

Method

The article uses a combination of research methods, such as historical and logical methods, collation and comparison, analysis and synthesis, inductive and interpretation, statistical methods from reference sources to serves in research and article presentation. Main findings the industrial revolution 4.0 has actively contributed to the cause of educating people, fostering talents, training human resources for socio-economic development. However, this revolution also brought negative aspects to Vietnamese higher education. Developing higher education in the context of industrial revolution 4, it is required that the Government have appropriate solutions and policies in the coming time (Tri & Nhe, 2020; Alaloul et al., 2020). The research findings can be used to provide key planning recommendations for the development of higher education in the context of industrial revolution 4.0.

Literature Review

Awareness and problem-solving education in the industrial revolution 4.0 is a large topic, attracting the research interest of many scientists and many socio-political organizations in countries around the world. Research on higher education. Jean-Jacques Rousseau mentioned the role of education in the formation and development of human personality in particular as well as the advancement of society in general, educational objectives, and methods. He also analyzes and deeply evaluates educational principles, the interaction between teachers and learners as well as builds a future education that he calls "natural education" and later. His name is closely linked to this natural educational

philosophy (Jean, 2008). Along with this topic, John Dewey presented on the philosophy of active education - the true value of knowledge in applying that knowledge, the vitality of knowledge is that knowledge is associated with the action; on the role and function of education; the thought of building a progressive education - is an active education with specific educational goals, flexible, creative, suitable for nature and achieving social efficiency; and education in a democratic society - an education that cares about the problems of ordinary people in society (John, 2008).

In Vietnam, Thomas J. Vallely discussed the history of Vietnam's educational development over the past decades, especially emphasizing efforts to overcome various challenges to achieve current achievements, in which, he spends more than eight pages discussing policies for developing teaching staff and educational management, mobilizing all resources in society to develop education. Finally, the report draws on three lessons learned: firstly, the Vietnamese government has always considered education and training, science and technology to be the top national policy; Secondly, the Vietnamese education system must be developed fundamentally and comprehensively in the direction of democratization, socialization, diversification, standardization, and modernization; Thirdly, the innovation in educational management in Vietnam starts from new thinking about educational development (Thomas, 2005).

Marxist views on the cause of education; educational science and educational development experience; educational development direction; the role of education in economic, social, political development and several issues posed to our education sector when entering the twenty-first century (Pham, 2003). The following studies, presenting the current educational situation of our country, the context, opportunities, and challenges for our country's education in the next few decades, the views guiding the development of education; education action programs have concretized the goals, guidelines, policies, and solutions for educational development in Vietnam (Pham, 2003).

In addition, there are also articles and speeches of leaders, former leaders of Party and State agencies, central and local agencies, managers, and scientists to contribute to the success of the fundamental and comprehensive renovation of education and training in Vietnam (Central Propaganda Department, 2012). Research on industrial revolution 4.0. The work of Klaus Schwab, The Fourth Industrial Revolution. In the book, the author presents contents such as revolution the fourth industrial network, its emergence and its profound changes; and the impacts of Industrial Revolution 4.0 on all areas of social life, especially for the world labor market (Klaus, 2018). Industrial Revolution 4.0 - Problems posed for socio-economic development and international integration of Vietnam, the author presented the most fundamental issues about the birth history of the industrial revolutions; industrial trends of the Industrial Revolution 4.0; opportunities, challenges, and requirements of the Industrial Revolution 4.0 for socio-economic development in general as well as for the labor market in Vietnam. From the analysis of the impact of the Industrial Revolution 4.0, the author has given directions and solutions to build and develop the capacity to innovate and think creatively to take advantage of opportunities and overcome the challenges of Industrial Revolution 4.0 in Vietnam in the coming time (Van Hoa, 2017;

[Priyadharshini et al., 2021](#)). The Fourth Industrial Revolution - The Revolution of Convergence and Savings has summarized the most basic features of the fourth wave of the industrial revolution taking place and attracted the special attention of the masses; the nature and impact of the fourth industrial revolution on the world labor market, security, and defense. In anticipation of some of the effects of the Fourth Industrial Revolution, countries around the world have come up with breakthrough policies to take advantage of the opportunities and overcome the challenges brought by them. Ensuring human rights before the impact of the industrial revolution 4.0, the study said: "Technology has the power to free us from drudgery or to decimate livelihoods, and the choices that governments and companies make will often determine the difference" ([Phil & Christen, 2018](#)).

Research results

Overview of the industrial revolution 4.0

In recent times, industrial revolution 4.0 has been mentioned a lot on social media. To be fully aware of industrial revolution 4.0, it is necessary first to summarize industrial revolutions in the history of human development. Klaus Schwab, founder and executive chairman of the World Economic Forum, said that the world had experienced three industrial revolutions, namely: The first industrial revolution lasted from 1760 to about 1840. The catalyst was the construction of railroads and the invention of steam engines, paving the way for mechanical manufacturing. The second industrial revolution, which began around the end of the nineteenth century into the twentieth century, opened up opportunities for mass production thanks to the advent of electricity and assembly lines. The third industrial revolution began in 1960. It is often called the computer revolution or the digital revolution because the catalyst was the development of semiconductor components, the host computer (1960s), the personalities (1970s and 1980s), and the internet (1990s) ([Klaus, 2018](#)). This was the period when automation machines replaced most of the human functions and brought the industrial society to the information society with the quick and cheap reception and information among businesses, production units, and consumers have become an important channel for people to conduct production and business activities as well as the way people enjoy.

Referring to industrial revolution 4.0, Klaus Schwab said: "The fourth industrial revolution formed based on the digital revolution and incorporates many technologies is driving the rapid transformation of the unprecedented model in terms of economy, business, society, and individuals. It not only changes what we are doing, how we do it, but who we are" ([Klaus, 2018](#)). On 04/05/2017, Prime Minister signed Directive 16/CT-TTg on strengthening the capacity to approach Industry 4.0, stating: "Industry 4.0 with the development trend based on the foundation the high level of integration of the digital - physical-biological connection system with the breakthrough of the Internet of Things and Artificial Intelligence is fundamentally changing the world's production base" ([Prime Minister, 2017](#)).

From that, it can be conceived: industrial revolution 4.0 is the integration between the fields of technology, digital, biology, a combination of virtual and real

systems, internet-connected systems; is the development of productive forces to meet increasingly intelligent needs for society. In essence, Industry 4.0 is the development of a productive force at the level of its peak to meet the smarter needs of society with the basic feature of integration among technology fields, digital, biology, is a combination of virtual and real systems, internet connection systems. The Industrial Revolution 4.0 spread around the world today is because the speed of development and the impact of technological breakthroughs have had unprecedented powerful effects (Dombrowski & Wagner, 2014; Tri, 2020). Inventions and scientific advances are present in all fields, such as artificial intelligence, robotics, the internet of things (IoT), self-driving cars, biotechnology, Nanotechnology, 3D printing, materials science, quantum computers, etc. affect almost every industry at such a rapid pace that it is said that the fourth industrial revolution is developing at a rate of the exponential function.

From the viewpoint and nature as above, industrial revolution 4.0 has the following characteristics: i) Industrial revolution 4.0 is a fusion of technologies, blurring the boundaries between the fields of physics, digital, and biology. This revolution is changing the way manufacturing and manufacturing of machines are connected to the internet and linked together through a system that can visualize the entire production process and make decisions that will gradually replace the previous production line; ii) Industrial revolution 4.0 can open a new era of investment, productivity and increasing living standards. The successful application in the field of robotics, the internet of things, big data, mobile phones, and 3D printing technology, so that the interaction process is faster, more convenient, and more accurate, helping to minimize optimize production processes, reduce costs, increase labor productivity, product quality, improve competitiveness in the context of globalization; iii) Industrial revolution 4.0 takes place with the unprecedented speed, scope and impact level in history. The speed of current breakthroughs is unprecedented in history. Compared to previous industrial revolutions, this Industry 4.0 is growing at an exponential speed rather than linear speed (Van Hoa, 2017; Shulga et al., 2021).

In summary, the impact of industrial revolution 4.0 is expected to make profound changes in the socio-economic situation of the nations as well as Vietnam. Vietnam is trying to "promote industrialization and modernization develop the knowledge economy, raising the level of science and technology" (Communist Party of Vietnam, 2016), in which the information technology field is defined as the key economic-technical sector, and an important driving force to promote production forces, improve national competitiveness, gradually realize the strategy of "shortening development", fast and sustainably. Therefore, the application of achievements of industrial revolution 4.0 can open up new opportunities for the socio-economic development of Vietnam in general, the development of education and training in particular.

Higher education in the context of Industrial Revolution 4.0

Industrial revolution 4.0 creates opportunities as well as sets essential requirements to build 4.0 education. Accordingly, education becomes an ecosystem where everyone can learn together anytime, anywhere with connected devices. The educational organization becomes an ecosystem that creates creative

products of individuals, with knowledge and capacity for innovation and creativity of individuals. Education 4.0 has a great change in training goals and methods, moving from imparting knowledge to the masses to unleashing potential and empowering individuals to create. Teachers will move into a new role as designers, catalysts, mentors, and creators of learning environments. With digitized learning content, learners will have their learning path, can choose content suitable for training goals ([Ariffin & Ahmad, 2021](#); [Vaidya et al., 2018](#)). The digital learning system also provides feedback on learning performance along with recommendations for additional learning content.

The scope of interaction in education 4.0 is very large, the distances in geography, space, and time are erased. The educational environment does not only take place within the school but extends to the global scale. Learners can actively study materials as well as interact with lecturers at any time using computers or smartphones. The development of online learning forms helps learners save time, effort, and costs. Augmented reality/virtual reality (AR/VR) technology is widely used to help learners experience and practice skills.

In education 4.0, thanks to the application of AI, Big Data, and IoT technologies, school leaders and lecturers can collect data, analyze and accurately evaluate learners; Monitor the learning process at home, check the completion of assignments and notify the results to students and families. Even AI technology can replace teachers in some stages such as attendance, grading, lesson preparation, and support for foreign language teaching ([Mubarak & Petraite, 2020](#); [Kumar et al., 2020](#)).

Currently, large technology corporations have launched many smart devices and software for education. For example, Google Education Kit (G-Suite for Education) provides free Word, Sheet, Slide, Google Docs helps learners create and edit documents online, for free. Chroma Key technology creates a miniature studio for learners to produce media products themselves. Cloud technology provides learning software on the Internet that uses an account.

However, industrial revolution 4.0 also poses significant challenges on the level of society in general and higher education in particular. The labor market is in danger of completely changing as robots gradually replace workers. Statistics of the International Federation of Robots show that the rate of robotization in the global industrial sector is reaching a very fast threshold, led by South Korea with the rate of 631 robots per 10,000 employees. The International Labor Organization (ILO) forecasts that, in the next two decades, about 56% of workers in five Southeast Asian countries, including Vietnam, are at risk of losing their jobs because of robots ([VTV New, 2017](#)).

Vietnam is becoming a country with high technology development potential, with millions of new jobs in the software sector. However, as automation gradually replaces human resources in many fields, workers need to adapt quickly to the change of production. Therefore, the university as a place to provide high-level human resources for society, must also comprehensively change both in terms of model, program content, and training methods.

With about 60% of the population of working age, Vietnam is still in the golden population period for at least another 20 years. However, due to a serious shortage of skilled workers and skilled technical workers in human resources, the competitiveness index of Vietnam's human resources only reached 3.39/10 points and the ability competitiveness of the Vietnamese economy ranked 73 out of 133 countries. Currently, about 52% of Vietnam's population uses the internet, and it is forecasted that by 2020 there will be about 100,000 employees working in the field of information technology (Cheng et al., 2021; Altbach, 1998). These are very important foundations and advantages that many high-tech corporations such as Fujitsu, Intel, Samsung, Siemens, Acatel are taking advantage of to expand investment in Vietnam.

The current labor force of our country is not lacking in quantity, but it lacks in professional knowledge, weak in problem-solving, leadership, and communication skills, leading to low labor productivity (only 4.4 percent) % Singapore; 17.4% of Malaysia; 35.2% of Thailand; 48.5% of the Philippines and 48.8% of Indonesia). With such a situation, the advantage of low labor costs in Vietnam is gradually losing its attractiveness to foreign investors.

In the industrial revolution, 4.0 interaction between devices and between devices and people will create a new product. Several new skills will be required mandatory for employees such as problem-solving skills, critical thinking, communication skills, collaboration, creativity, new change. This is the important point of the following direction, make change the program Training and forming new majors in universities but also requires all elements to be "learned" for employees in the industrial revolution 4.0.

The training and scientific research activities of universities also face new reform and competition requirements before the development of Industry 4.0. Many corporations have great scientific, human, and financial potential, have an advantage in the race to turn knowledge into service products, and have many practical experiences that researchers, university Teaching students do not have. Besides, free trade in global higher education services creates competition between universities and abroad in attracting students.

Challenges and opportunities for Vietnamese higher education

Given the development of higher education in the context of industrial revolution 4.0, Vietnamese education has basic advantages to accept the development opportunities that this industrial revolution brings. Vietnam has a big advantage in the popularity of smartphones and the internet. According to statistics, the number of internet users in 2018 reached 64 million, accounting for 67% of the population. Vietnam can be in the top 10 countries with the highest percentage of people accessing the Internet, with about 80% of the population using the internet by 2020. Particularly in the social network segment, as of January 2018, there are 55 million people. use, accounting for 57% of the population. The high percentage of Internet users in the population is one of the initial conditions to help Vietnam access education 4.0 faster.

The Vietnamese government has always paid attention to the cause of education, especially in the context of rapidly developing science and technology. The Eighth Conference of the 11th Party Central Committee issued Resolution No. 29-NQ/TW on a fundamental and comprehensive renovation of education and training to meet the requirements of industrialization and modernization. in the context of a socialist-oriented market economy and international integration, on November 4, 2013. The Prime Minister issued Directive No. 16/CT-TTg on increasing access to the Public Revolution. Fourth career (May 4, 2017). The Ministry of Education and Training has developed a Project to support students and students to start a business by 2025; Project on capacity building of lecturers and managers of higher education institutions to meet the requirements of a fundamental and comprehensive renovation of education and training in the period of 2019 - 2030; The overall higher education development strategy for the period 2021-2030, with a vision to 2035, is the basis for innovation, comprehensive development and long-term sustainability of the higher education system.

Many educational institutions have proactively approached new waves of educational technology to deploy training based on mass open online courses (MOOCs), bring AR and VR into building learning systems or deploy intelligent digital learning systems. For example, Polytechnic University Ho Chi Minh City has innovated its training model and program, allowing learners to actively choose, plan, and register for courses in the integrated program. Ho Chi Minh City University of Medicine and Pharmacy deploys digitalization with image management software Centricity Universal Viewer and Advanced Visualization, allowing to improve workflow, help doctors diagnose and make effective reports, more exactly.

Many centers and schools have built online classes. Apex Franklin Academy (Hanoi) has combined the teaching and learning model according to 4.0 technology, applying the three-in-one method (Facetime - App time - Team time) at the high school level, developing students' ability through across tasks at all times. The "Samsung Smart school" model has taken shape at the University of Medicine and Pharmacy, Thai Nguyen University, making the acquisition of knowledge attractive and interesting, encouraging two-way communication. between teachers and students. This model includes Interactive Teaching (Interactive Teaching) with smart devices, Learning Management (Classroom Management) combined with Group Learning (Group Learning).

Regarding the contingent of educational administrators, teachers - a force that plays a key role in educational innovation - are always interested, invested in, and supported in capacity building. Professional standards and regulations of all levels of management and teachers are prepared for promulgation. Those standards and regulations will be tools to support management, teachers in capacity-building work to be able to answer the requirements in the new period. Although there are still many concerns about Vietnam's learning program that is not linked to reality, the high results in the PISA test, the Intel ISEF international science and engineering exam, the international and regional Olympic competitions This area contributes to affirming that our education has begun to move, focusing on directing students to apply knowledge to solve practical problems, instead of just memorizing content from textbooks. . This result also

demonstrates the potential of our human resources in the fields of math and science if properly invested.

In addition, the Vietnamese educational program places great emphasis on helping students gain a deep understanding of core concepts and mastery of knowledge. The new general education program will be put into operation from 2019, moving from a content approach to developing capacity and quality will be the premise for the fundamental and comprehensive renovation of general education.

Over the past time, the Ministry of Education and Training has promoted the policy of giving schools more autonomy in implementing curricula and testing. These innovations have positive effects on the quality of our education. In the World Bank's recent report *Growing Smarter: Learning and Equitable Development in East Asia and the Pacific* (World Bank, 2018), Vietnam and China are ranked as two pioneers in educational innovation, has a really impressive development education system, which can become important lessons learned for other countries.

To date, specific actions and strategies for the process of educational industrialization have been slow. The digital transformation of the university is just the beginning. Universities have not yet created a connection between domestic and international higher education standards. The quality of the university-trained workforce has not yet met the needs of socio-economic development and international integration; lack of scientific research of international quality from higher education institutions. The link between universities and enterprises in higher education is currently not tight; Graduates do not immediately meet the job requirements.

Some innovative solutions for higher education in the context of industrial revolution 4.0

Raising awareness and renewing thinking about the higher education development in the general development strategy of the country. To effectively take advantage of opportunities and overcome challenges from industrial revolution 4.0, universities need to raise awareness of the importance of industrial revolution 4.0; about changes in the job market; about the university's mission in preparing highly qualified human resources, and participating in labor market restructuring. The overall higher education development strategy should identify the key role in providing highly qualified human resources and making direct contributions to the country's socio-economic development; training a workforce with professional qualifications, soft skills, creative thinking, and the ability to adapt to the constant changes of the global labor market. With a long-term vision, the higher education system must actively innovate and create; comprehensive integration with the world higher education system.

It is necessary to improve the capacity of state management and university administration, to plan the network of higher education institutions; ensure financial sustainability, and enhance transparency. Create consensus among all levels, ministries, training institutions, and stakeholders in higher education.

Focus on reviewing and amending regulations on the role of university councils in university governance; guide and strengthen oversight of the accountability of higher education institutions; have mechanisms and policies to create favorable conditions and environment, and to create a legal framework for the relationship between higher education institutions and enterprises.

Innovate training models, programs, and methods. Training objectives need to change towards promoting creativity and developing personal capacity. Start-up-oriented training can be implemented according to the "5 in 1" model, in which the output standard with many new skills of citizens 4.0 and 5 components include: There are many new training programs related to the industry, high transdisciplinary and many training programs associated with 4.0 technology; New training program structure; New training technology; New Startup Projects and New Startup Education Ecosystem connects all stakeholders: instructors, learners, lecture halls, labs, and users.

Instead of teaching a common curriculum, it is necessary to develop different programs to personalize training; It is necessary to identify the strengths and weaknesses of each learner to design an appropriate training program. To promote research and development of new disciplines (e.g., artificial intelligence, data analytics, intelligent ICT convergence), the curriculum system also needs to be changed and updated continuously. customary. Focus on training new skills such as information search; Upgrade software; access and store data; use sensors, work with robots; using Blockchain technology; problem-solving, critical thinking, creativity; Personnel; working team.

It is necessary to change the thinking of teaching and learning according to new methods so that learners can both acquire knowledge and apply creatively into practice. Combining traditional methods (presentation, conversation, practice) with new methods (problem-solving, case teaching, action-oriented teaching). At the same time, applying methods associated with modern technology such as E-learning online teaching, educational methods integrating science, technology, STEM Education.

Accelerate the digital transformation process and take the lead in applying new technologies. Digital transformation must ensure 4 factors, including empowering lecturers; exchange with students; organizational optimization, and method innovation. University digital transformation takes place in all 3 phases, including planning; independently formulate strategies and implement innovations; monitor the impact of technology deployment.

Currently, there are many tools for digital transformation such as Skype video conferencing tool, GoToMeeting, Blue jeans; chat application, sharing resources Microsoft Teams; the OneNote application; Heating; reader analytics application Reader Analytics; look up the Tflat dictionary; Applications that support drawing mind maps (Mindnode, Simplemind); Wolfram Alpha Online Service; Power BI Tools and Learning Management System Blackboard, WebCT, Desire2Learn, ANGEL, Sakai, Moodle ... Universities need to apply new technology, using multi-tools such as computers, projectors, lectures electronics, smart boards, electronic textbooks, especially teaching software (E-Learning). Accordingly, the organization

of classes, assignment of assignments, time limits, checking assignments, providing documents, receiving feedback, adjusting student activities, etc. are all manipulated on computers.

Building miniature studio models using new technologies, virtual classrooms, virtual laboratories, virtual devices, virtual libraries under the support of smart devices. Research and apply AI technology, especially in synthesizing learning information, useful suggestions for learners and teachers, enabling learners to access standardized curriculum individually, in assessment capacity and needs of learners, or used to overcome the shortage of teaching staff.

Innovate the connection model between universities and businesses. It is necessary to establish a high-level overall model based on establishing a common cohesive pattern with many forms in a tight, interoperable, and support system. The university has both training and technology transfer, or a combination of training, research, and implementation (Giang & Tri, 2021; Tran, 2010). From this overall model, establish a specific and separate model, such as linking in the form of university training by studying and working; theoretical training at university, skill practice at enterprises; training according to the enterprise's orders expanding training lecture halls from universities to enterprises. Mechanisms and policies must take the quality of training as a bridge to connect according to market principles, especially the labor market and on a harmonized basis, sharing benefits of the parties; establish a governance institution that models the connection between universities and businesses (evaluating outputs; feedback from businesses).

Emphasis is placed on sending university lecturers to practice at enterprises to supplement and update knowledge, technology, improve vocational skills, teaching methods and use part-time lecturers of enterprises, or intellectuals. formalize trainers from business for use in universities; enhance interaction between lecturers and businesses; design specialized training courses at the request of the ordering enterprise or increase the participation of the partner enterprise in the development of programs and curricula; invest in training infrastructure to meet the requirements of enterprises (Tri, 2021; Tri & Hau, 2020; Utomo & Darma, 2020).

Improve the quality of teachers and administrators. To ensure the autonomy of higher education institutions in the selection and approval of lecturers eligible for doctoral and master training. Strictly control the stages of acceptance, assessment of theses, theses, recognition, grant of diplomas, assurance of output quality. Having the policy to attract qualified, qualified scientists, to work as lecturers at higher education institutions.

Organize and compile training programs and documents to improve university administration capacity for key managers including the president of the university council, principal, vice-chancellor (and equivalent), and staff affiliated unit-level management of higher education institutions. Organize training courses to improve management capacity for key managers and managers at the affiliated units of higher education institutions.

Strengthen international cooperation and integration in training. International cooperation and integration create opportunities for students to participate in exchange programs or study abroad and have the freedom to develop personally; allowing lecturers to learn management and educational methods from international universities and helping partners understand higher education in Vietnam; creating opportunities for transnational scientific research cooperation; improve quality in the direction of approaching regional/international standards in management, training, and research, and at the same time can create a competitive labor source, reaching to export high-skilled labor (Party, 2013; Saxena et al., 2017).

International cooperation activities should be oriented and organized from the top management level and be planned at the whole school scale, not just the function of the International Cooperation Department at present. With a high degree of autonomy, university faculties need to be proactive in organizing forms of international cooperation and integration according to the strategy proposed by the Rector Board. In addition to the above solutions, universities need to pay attention to education security, seek information security measures with the help of AI technology and Information Security experts to control threats. Potential

Conclusion

In this day and age, when humanity is entering the knowledge economy and science becomes a direct production force, especially in industrial revolution 4.0, education has an increasingly important role and position. An important period for the development of each nation and every nation. But in the context of our country's lagging behind the regional and global levels, if we want to bring the city's education in particular, Vietnam, in general, reaches the advanced level in the region, meeting the requirements of industrialization, modernization, and international integration, we need to take advantage of available strengths and seize opportunities, overcome challenges, develop education in Vietnam.

Accordingly, to succeed in the coming decades and increase the competitiveness of Vietnamese people, we need to build an education system that fosters innovation and creativity to train future workers. Future generations will need to be capable of lifelong learning to be ready for change. Today's educational institutions are largely a product of the technological infrastructure and social circumstances of the past. In the rapidly changing context, educational institutions need to rethink to improve their responsiveness. Agencies and businesses must also adapt to the changing environment and need to determine the importance of developing human resource development strategies towards sustainable development goals through cooperation with universities.

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