REVOLUTION OF INDUSTRY 4.0 AND ITS INFLUENCE ON HIGHER EDUCATION IN VIETNAM TODAY

REVOLUÇÃO DA INDÚSTRIA 4.0 E SUA INFLUÊNCIA NA EDUCAÇÃO SUPERIOR NO VIETNÃ HOJE

REVOLUCIÓN DE LA INDUSTRIA 4.0 Y SU INFLUENCIA EN LA EDUCACIÓN SUPERIOR EN VIETNAM HOY

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ABSTRACT: The objective of this study was the revolution of industry 4.0 and its influence on higher education in Vietnam today. The method of this research is descriptive in which the researchers studied the subject using documents. The fourth industrial revolution has a strong impact on all areas of social life including higher education. The fourth industrial revolution has a direct impact on the production structure and human structure of the labor market, and therefore, higher education must also change to create human resources suitable for the current market and future employment. Based on an overview assessment of the impact of the fourth industrial revolution, a study of reports and documents on higher education evaluation, the article focuses on analyzing the impacts of the fourth industrial revolution on higher education and propose some solutions to improve the quality of higher education in Vietnam today.

KEYWORDS: Revolution of Industry 4.0. Influence. Higher education. Vietnam today.

RESUMO: *O objetivo deste estudo foi a revolução da indústria 4.0 e sua influência no ensino superior no Vietnã atual. O método desta pesquisa é descritivo em que os pesquisadores estudaram o assunto por meio de documentos. A quarta revolução industrial tem um forte impacto em todas as áreas da vida social, incluindo o ensino superior. A quarta revolução industrial tem impacto direto na estrutura produtiva e na estrutura humana do mercado de trabalho e, portanto, o ensino superior também deve mudar para criar recursos humanos adequados ao mercado atual e à empregabilidade futura. Com base em uma avaliação geral do impacto da quarta revolução industrial, um estudo de relatórios e documentos sobre avaliação do ensino superior, o artigo se concentra em analisar os impactos da quarta revolução industrial no ensino superior e propor algumas soluções para melhorar a qualidade do ensino superior no Vietnã atual.*

PALAVRAS-CHAVE: *Revolução da Indústria 4.0. Influência. Ensino superior. Vietnã hoje.*

RESUMEN: *El objetivo de este estudio fue la revolución de la industria 4.0 y su influencia en la educación superior en Vietnam hoy. El método de esta investigación es descriptivo en el que los investigadores estudiaron el tema utilizando documentos. La cuarta revolución*

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industrial tiene un fuerte impacto en todos los ámbitos de la vida social, incluida la educación superior. La cuarta revolución industrial tiene un impacto directo sobre la estructura productiva y la estructura humana del mercado laboral, por lo que la educación superior también debe cambiar para crear recursos humanos adecuados al mercado. empleo actual y futuro. Sobre la base de una evaluación general del impacto de la cuarta revolución industrial, un estudio de informes y documentos sobre la evaluación de la educación superior, el artículo se centra en analizar los impactos de la cuarta revolución industrial en la educación superior y proponer algunas soluciones para mejorar la calidad. de la educación superior en Vietnam hoy.

PALABRAS CLAVE: *Revolución de la Industria 4.0, Influencia, Educación superior. Vietnam hoy.*

Introduction

The fourth industrial revolution has been creating and will continue to create strong changes, affecting all aspects of life - a society in the 21st century. This revolution has and will form technologies that help blur the boundaries between physical, digital, and biological fields both in life, production, as well as in the field of education - formation, in which have a university education (ANEALKA AZIZ HUSSIN, 2020). Unlike the third industrial revolution, this fourth industrial revolution has a wide application and very fast application speed that is transforming every industry in every country. The breadth and depth of these changes constitute the transformation of the entire production, management, and governance systems. New technological breakthroughs in areas such as artificial intelligence, robotics, the Internet, 3D printing, nanotechnology, biotechnology, materials science, energy storage, and quantum informatics will have a stronger impact on social life.

For higher education, the product of higher education is human resources. Formation to create quality human resources, suitable and meeting the requirements of the labor market, or not, will be the basis for assessing the quality of higher education (ANH; CONG; KHOI, 2016). Especially in the current period, the industrial revolution 4.0 affects production and human structure in the future labor market and thus, affects the way higher education and its requirements are met. Education must transform strongly to create high-quality human resources for national development and international integration (HANG; VAN, 2020).

First, industrial revolution 4.0 affects production. The shift from the third industrial revolution to the fourth industrial revolution is essentially a shift from a digital (simple, mechanical) revolution to a creative revolution (based on innovation and combination of

technologies). This revolution is and will force businesses to change their production methods and the way they do business.

Technology has helped businesses with new devices, including virtual ones, to create new products and services with new delivery methods (ordering and delivering goods online, etc.). On the other hand, the fourth industrial revolution will create increasingly strong competition between businesses and economies, and human capacity rather than financial capital will become the decisive factor for the production base. Moreover, in this revolution, the labor market will be seriously challenged between the quality of labor supply and demand as well as the labor structure (HOA, 2017).

As automation replaces people in many areas of the economy, workers will certainly have to adapt quickly to the change of production, or they will be redundant and unemployed. In some fields, with the appearance of Robots, the number of employees will be reduced compared to today and, therefore, the remaining human resources will have to change jobs or become unemployed. A series of old occupations will be lost and replaced by new ones. The domestic and international labor market will strongly differentiate between low-skilled and high-skilled workers.

Researchers have shown that the 4.0 revolution not only threatens the jobs of low-skilled workers, but even middle-skilled workers will be affected if they are not equipped with new skills - creative skills for the 4.0 economy. At the same time, industrial revolution 4.0 will also put new requirements on the knowledge, skills, and attitudes of workers (HAU, 2017). Knowledge and skills can be divided into three groups: 1) Knowledge and skills related to cognition, thinking systems, critical thinking, adaptive skills, and creative skills. 2) Physical skills: language skills, digital skills, networking skills; 3) Social skills: communication, behavior, relationship building, teamwork. Thus, the integrated application of knowledge, skills, and attitudes to innovation is much more important than previous specialized knowledge and skills. Thus, these changes in production and human structure in the future labor market pose many problems for higher education.

Results And Discussion

Impact of the fourth industrial revolution on Vietnamese higher education

The impact of the industrial revolution 4.0 on higher education is huge, creating opportunities but also posing many challenges, specifically:

First, industrial revolution 4.0 poses a huge formative demand for universities. The industrial revolution 4.0 requires high-quality human resources, meeting the requirements of knowledge, skills, and qualities, which are constantly changing in the new working environment. This is an urgent requirement for education, especially higher education. Therefore, the education sector must quickly transition from a knowledge-heavy education to an education that helps develop students' capacity and promotes innovation and creativity. Thus, at universities, new learning models will be born with the development of science technology, gradually replacing traditional teaching-learning methods.

In all fields of industry, breakthrough steps in new technology will have an even stronger impact on social life. The higher education system will be strongly and comprehensively affected. Due to the connection between the fields of physics - biology; mechanics - electronics - biology, a series of old majors and disciplines will be lost and replaced by opportunities for the development of new majors and formative disciplines, especially related to the interaction between people and machines. The domestic and international labor market will have a strong division between low-skilled and high-skilled workers (SCHWAB, 2016). Industry revolution 4.0 not only creates formative opportunities for young people but also requires those who are already employed, from workers to engineers, to change and update their knowledge and skills at a high level. According to analysts, by 2020, Vietnam will need one million information technology staff, but currently, we only have 300,000. The new formative needs of this industry alone represent a great opportunity for universities.

Second, the industrial revolution 4.0 changes all activities in universities. To meet enough human resources for the creative economy, it is necessary to change formation activities, from program innovation, teaching methods, student management, testing methods, and output standards assessment, with the strong application of information technology. Accordingly, the old teaching methods are no longer suitable for the needs of society. With the application of technological achievements, learners anywhere can access the university's library for self-study and self-discovery.

Thus, the traditional library model cannot exist, but schools must build an electronic library. Schools must change their teaching model, such as online formation without classrooms, without teachers in class, learners will be guided through the internet. Virtual classrooms, virtual teachers, virtual devices with simulation, lectures are digitized and shared via platforms such as Facebook, YouTube, Grab, Uber etc., which will become a development trend in higher education activities in the near future. Knowledge cannot be limited and

exclusive to one person or within a certain organization (HAU, 2017). Students have many opportunities to approach, accumulate and refine new and interesting things to become global citizens - future workers capable of working in a creative and competitive environment. For students, learning is not just about receiving a degree, but about exchanging knowledge, creating, and generating values that contribute to society (HANG; VAN, 2020). Therefore, recruiting organizations and businesses need people who can do the job, not people with high degrees. As such, universities will have to drastically switch to a model of formation that only encompasses "what the market needs", the contents of basic subjects will have to be shortened and replaced with the content necessary to meet the needs of the labor market and help learners realize the motto "lifelong learning".

According to this new model, the connection between formation institutions and organizations and enterprises is an indispensable requirement to complement each other, promote the constitution of formation institutions in enterprises to divide resources, making use of resources with the highest efficiency. Faced with the increasing demands of the labor market, to match the new production environment, the formative activities of universities must be linked with organizations and enterprises in order to shorten the gap between formation, research, and implementation. Promote the development of formation at enterprises, develop schools in enterprises to train human resources suitable to the technology and organization of the enterprise. Strengthening the connection between universities and businesses on the basis of corporate social responsibility, towards businesses that are truly "extended arms" in university formation activities in order to effectively use equipment and technology of the enterprise to serve the formation, thereby forming the professional capacity for learners during training and internship at the enterprise (IBARRA; GANZARAIN; IGARTUA, 2017).

This will affect the arrangement of management, service, and teaching staff of universities. Then, all the data of learners from codes, grades, personal information etc., are all digitalized in one place, while still ensuring privacy, efficiency, and synchronicity. Faced with this fact, if schools do not change their formative models, they will be obsolete, there will be no learners. What are the needs of businesses in particular and the market in general, more learners will tend to find places that meet those needs? This is really a challenge because most schools today just stop at the level of lecturers teached by projectors, videos, and sharing documents online. Limited funding is also one of the main reasons why science and technology applications have not developed strongly in universities.

In the environment of industrial revolution 4.0, each student with different learning needs and abilities will be designed a separate learning pace, suitable for each person. The formation software will replace part or all of the knowledge of the textbook when learning in class. Instead of focusing on providing learners with knowledge and skills, the new teaching model mainly guides students on how to self-study, how to think, and handle situations in life, thereby forming their competence and ability to solve problems.

For the teaching staff, the school management system with the support of technology will provide a data system to help them track the progress and progress of each class, and promptly solve the problems that arise from students during their studies (HIEP; PHONG; VAN, 2020). Therefore, lecturers need to make efforts to study and research to be able to take advantage of and master technology, so that these tools support and create freedom and creativity in formation.

Problems facing the reform of higher education in Vietnam today

These changes of production and human structure in the future labor market pose many problems for higher education, which are:

First, to meet the needs of high-quality and diverse human resources in the 4.0 economy, higher education institutions must innovate strongly from training formation to environment administration to create “products” - future workers who are capable of working in a creative and competitive environment (HOA, 2017). While the industrial revolution 4.0 have and will continue to have a strong impact on the labor market, higher education institutions, which provide human resources mainly for the economy, still promote formation in the old way. Learners with the knowledge and skills being taught in schools today that have not yet met the requirements of the current 3.0 economy, may be completely useless in the 4.0 economy, or be easily stroke by robot’s replacement in the near future (MINH, 2017).

Second, to meet the needs of human resources for the creative economy, it is necessary to change formative activities, especially formation methods and methods with the strong application of information technology. However, at the present, the conditions to ensure this change are still limited. Currently, in most higher education institutions, the innovation of teaching and learning methods is still quite slow; Information technology infrastructure is still outdated (except for some facilities that have investments in high-quality schools) and asynchronous. The national database system on higher education is designed and built to allow the collection, processing, updating, and synchronization of information and data on

higher education nationwide and supporting the search, make statistics, report, analyze and forecast to serve the administration and management of higher education from the central government to ministries, branches, localities, and higher education institutions nationwide. In addition, the pilot implementation of digitization of lectures, simulation of practice to form an electronic lecture database in order to modernize teaching and learning, towards the formation of an electronic lecture database with e-learning resources, e-lecture building resources to support teaching.

Third, the change in school governance. Virtual formation, simulation, digitization of lectures will be the trend of formation in the future. This affects the arrangement of managers, service staff, and teaching staff of higher education institutions (VAN, 2020). This team must be professionalized and highly creative, have modern formation methods with the strong application of information technology and this leads to a change in staff size and structure (both in terms of qualifications and skills), there will be a phenomenon of excess and shortage of human resources.

Fourth, in parallel with improving the quality of lecturers, renovating the school model is a very necessary solution. There is a need for a drastic shift towards formation directed only to "what the market needs" and "what the market will need". According to this new model, the connection between higher education institutions and businesses is a requirement; at the same time, promote the creation of formation institutions in enterprises to share common resources: physical facilities, finance, human resources, more importantly, shorten the transfer time from knowledge and skills in real life. However, the close relationship between schools and businesses; between training and using trained human resources is still very "loose", it has not become the "social responsibility" of enterprises.

Fifth, the issue of management innovation both at the macro level and at the grassroots level for higher education. With the appearance of virtual classrooms, virtual programs, and the requirements of the labor market with new creative skills, there is a need for general management to move towards ensuring on the one hand the "ground" quality; on the other hand, meet the diverse needs of the creative and competitive economy. However, this is also a problem of management both at the macro level and at the grassroots level, when the legal basis system is in the process of being supplemented and perfected. On the other hand, in terms of management, the lack of synchronization, the lack of clarity between the functions of state management and school administration are limitations that have been pointed out and have only recently been initially overcome.

Some innovative solutions to Vietnamese higher education in the industrial revolution 4.0

First, raising awareness and renewing thinking about the higher education development in the overall national development strategy. To effectively take advantage of opportunities as well as overcome challenges from the fourth industrial revolution, universities need to raise awareness of the importance of the fourth industrial revolution; about changes in the job market; on the university's mission in preparing high-level human resources and participating in labor market restructuring.

The overall higher education development strategy should identify the key role in providing high-level human resources and making direct contributions to the country's socio-economic development; ensure the formation of a workforce with professional qualifications, soft skills, creative thinking, and the ability to adapt to the constant change 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, formation institutions, and stakeholders in higher education. Focus on reviewing and amending regulations on the responsibility of the university council's role in university governance; guide and strengthen oversight of the accountability of higher education institutions; have mechanisms and policies to create favorable conditions and environment, create a legal framework for the relationship between higher education institutions and enterprises.

Second, innovate formative models, programs, and methods. Formation objectives need to change in the direction of promoting creativity and personal capacity development. Start-up-oriented formation can be deployed with output standards including many new skills of citizens. There are many new formation programs of high interdisciplinary and transdisciplinary nature and many formation programs associated with 4.0 technology; New formation program structure; New formation technology; New Startup Projects and New Entrepreneurship Education Ecosystem connecting all stakeholders: teachers, learners, lecture halls, laboratories, and users.

Instead of teaching a common curriculum, it is necessary to develop a variety of programs that personalize formation; It is necessary to clearly identify the strengths and

weaknesses of each learner in order to devise an appropriate formation program. To promote research and development of new disciplines (for example, artificial intelligence, data analysis, intelligent ICT convergence), the curriculum system also needs to be changed and updated continuously. Focus on training new skills such as information search; Software updates; access and storing data; use sensors, working with robots; using Blockchain technology; problem-solving, critical thinking, creativity; HRM; teamwork etc.

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

Third, speed up the digital transformation process and take the lead in applying new technologies. Digital transformation must ensure 4 factors, including empowering lecturers; interacting with students; organizational optimization, and method innovation. University digital transformation takes place in all three stages, including planning; independently formulating strategies and implementing innovations; monitor the impact of technology deployment.

Currently, there are many tools for conversion and therefore, universities need to apply new technology, using multi-tools such as computers, projectors, electronic lectures, smart boards, electronic textbooks, especially teaching software (E-learning, Meeting, Zoom, etc.). Accordingly, organizing classes, task allocation, limiting time, checking assignments, providing materials, getting feedback, adjusting student activities etc., are all performed on machines.

Build miniature studio models using new technology, virtual classrooms, virtual labs, virtual devices, virtual libraries etc., with the help of smart devices. Research and apply AI technology, especially in the synthesis of learning information, useful suggestions for learners and teachers, creating conditions for learners to access standardized curriculum individually, in assessment, improving the capacity and needs of learners, or used to overcome the shortage of teaching staff (for example, teaching foreign languages).

Fourth, improve the quality of teachers and administrators. Promote capacity building of lecturers and managers of higher education institutions to meet the requirements of a fundamental and comprehensive renovation of education and formation in the period of 2019

- 2030. Accordingly, a survey is conducted, evaluate the formative capacity of higher education institutions; identify the key fields, branches, and majors that need to be prioritized; publish lists and information on universities of good quality, creating conditions for learners to choose and be active in learning and research; create favorable conditions for domestic higher education institutions to link and cooperate in formation.

Ensuring the autonomy of higher education institutions in the selection and approval of lecturers eligible for doctoral and master's formation. Strictly control the stages of acceptance, assessment of theses, grant of diplomas, assuring the output quality. Having the policy to attract qualified and qualified scientists to work as lecturers at higher education institutions.

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

Fifth, renew the connection model between universities and businesses. It is necessary to establish a high-level overall model based on establishing a common cohesive model with many forms in a tight, interoperable, and support system. The university offers both formation and technology transfer, or a combination of formation, research, and implementation. From this overall model, set up a specific and separate model, such as linking in the form of university formation by doing and studying; theoretical formation at university, skill practice at enterprises; formation according to the order of the enterprise; expanding lecture halls from university to enterprise etc. Mechanisms and policies must take the quality of formation as a bridge to connect according to market principles, especially the labor market, and on the basis of harmony and sharing of benefits; establish an institution governing the model of university-enterprise linkage (evaluating outputs; feedback from enterprises etc.).

Attaching importance to sending university lecturers to practice in enterprises to supplement and update knowledge, technology, improve vocational skills, teaching methods and use part-time lecturers of enterprises, or intellectuals to formalize trainers from businesses for use in universities; enhance interaction between lecturers and businesses; design specialized formation 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 formative infrastructure to meet the requirements of enterprises.

Sixth, strengthen international cooperation and integration in the required formation. International cooperation and integration create opportunities for students to participate in exchange programs or study abroad and have the freedom to develop personally; allow faculty to learn governance and educational practices from international universities and help 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, formation, and research, and at the same time creating a competitive labor source, reaching out to export high-skilled labor. International cooperation activities should be oriented and organized from the top management level and planned at the whole school scale, not just the function of the International Cooperation Department as today. 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 educational security, seek information security measures with the help of AI technology and Information Security experts to control potential threats.

Conclusion

The quality of human resources depends on the quality of higher education, in order to have high-quality human resources, the quality of higher education must be improved. Before the impact of the industrial revolution 4.0, Vietnamese higher education needs to implement synchronous solutions: raising awareness and renewing thinking about higher education development in the overall development strategy of the country; innovate formative models, programs and methods; speeding up the digital transformation process, anticipating the application of new technologies in teaching. Improve the quality of teachers and administrators. At the same time, renew the connection model between universities and businesses, strengthen cooperation and international integration in training.

REFERENCES

ANH, P.; CONG, H. T.; KHOI, P. M. The 4.0 Industrial Revolution: context, major trends, and typical products. **Automation Today**, v. 5, 2016.

HANG, L. T.; VAN, V. H. Building Strong Teaching and Learning Strategies through Teaching Innovations and Learners' Creativity: A Study of Vietnam Universities.

International Journal of Education and Practice, v. 8, n. 3, p. 498-510, 2020. DOI: 10.18488/journal.61.2020.83.498.510

HAU, N. H. Some philosophical issues of the fourth industrial revolution. **Journal of Political Theory**, v. 7, 2017.

HIEP, H. D.; PHONG, N. X.; VAN, V. H. Change the methods of higher education: necessity, barriers difficulties and solution. **Journal of Natural Remedies**, v. 21, n. 8-1, p. 150-162, 2020. Available: https://jnronline.com/ojs/index.php/about/article/view/545. Access: 10 Jan. 2021.

HOA, T. T. V. (Ed.). **Industrial Revolution 4.0**: Problems for Vietnam's socio-economic development and international integration. Hanoi: National Politics, Truth, Hanoi, 2017.

HUSSIN, A. A. Education 4.0 Made simple: Ideas for Teaching, International. **Journal of Education & Literacy Studies**, v. 6, n. 3, p. 45-67, 2020.

IBARRA, D.; GANZARAIN, J.; IGARTUA, J. I. Business model innovation through Industry 4.0: A review. *In*: INTERNATIONAL CONFERENCE INTERDISCIPLINARITY IN ENGINEERING, 11., 2017, Tirgu Mures. **Proceedings** […]. Tirgu Mures, Romania: INTER-ENG 2017, 2017.

LUONG, P. V.; VAN, V. H. 'Education Responsibility Protection Environmental For Students: Duties, Requirements And Necessity'. **Journal of Contemporary Issues in Business and Government**, v. 27, n. 1, p. 155-166, 2021.

MINH, N. H. The Industrial Revolution 4.0 and the problems posed to the vocational education system. **Journal of Labor and Social Affairs**, v. 2, 2017.

SCHWAB, K. **The 4.0 Industrial Revolution, First Edition**. New York, USA: Crown Business, 2016. ISBN: 9781524758868.

TRUNG, N. S.; VAN, V. H. Educating Traditional Cultural Values in Vietnam Universities. **South Asian Research Journal of Humanities and Social Sciences**, v. 2, n. 3, p. 210-214, 2020.

TRUNG, N. S.; VAN, V. H. Vietnamese cultural identity in the process of international integration. **Journal of Advances in Education and Philosophy**, v. 4, n. 6, p. 220- 225, 2020.

VAN, V. H. Identify methods of teaching and learning to create interest, self-study, and creativity of students. **Humanities & Social Sciences Reviews**, v. 8, n. 3, p. 646-656, 2020. DOI: 10.18510/hssr.2020.8369

VAN, V. H. Social responsibility of students: the role and importance of education. **Journal of Natural Remedies**, v. 21, n. 8, p. 241-254, 2020. Available: https://jnronline.com/ojs/index.php/about/article/view/560. Access: 10 Jan. 2021.

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