APPLYING IMAGE TECHNOLOGY IN TRADITION AND CULTURE EDUCATION OF HANOI PEOPLE IN THE CONTEXT OF INDUSTRY 4.0

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Abstract: *Industry 4.0 with technological achievements has a great impact on the field of life and social culture. This article focuses on the theoretical basis of the technology of image technology, the context of the 4.0 revolution and the problems posed in the application of image technology in the issue of cultural education Hanoi's traditions in order to contribute to preserving traditional and cultural values as well as international integration for Hanoi Capital in the current stage.*

Keywords: *Image technology.*

1. INTRODUCTION

The development of the world in the Industry 4.0 has been going on very strongly. It is possible to say that from now until 2030, technology will support and become an important part of education. The question raised in the content of the research is: The classes in 2030 and readiness for a new educational philosophy is that technology is required. The process of focusing on research with current students at a young age can see that technology has a huge impact on them. In the future, technology skills require emotional skills, and career skills so that it can bring about the success of the field in which students are trained.

In the current context, educational activities are being used with the great participation of technology, in which simulation and imaging technology are used as a multimedia tool offering many options. For users, in order to evaluate the role of and the experimental results of the research problem without having to experiment in the field or in real systems, this is

an important advantage of the simulation technology and imaging technology contributing to limit the cost as well as time and risks occurring during field experiments. Using imaging technology contributes to the answer of the question about a system or problem that needs to be studied without real experience on the system or problem that needs research in practical terms.

2. CONTENT

2.1. Background of Industry 4.0 and the advent of imaging technology

The world is in the early stages of the The Fourth Industrial Revolution, which began at the turn of this century and is built on the digital revolution, characterized by the popularity of Internet, by smaller and more powerful sensors at a cheaper price and by artificial intelligence. Digital technologies with computer hardware, software and networking systems are becoming more and more complex, more integrated and thus transforming society and global economy.

According to GS. Klaus Schwab, President of the World Economic Forum, Industry 4.0 or the Fourth Industrial Revolution, is a term that encompasses a wide range of modern automation, data exchange and fabrication technologies. The 4th Industrial Revolution is defined as "term for the technologies and concepts of the organization in the value chain" associated with physical systems in virtual space, the Internet of Things (IoT) and Internet of services (IoS).

The essence of the 4th Industrial Revolution is based on digital technology and integrates all intelligent technologies to optimize processes and production methods; emphasizing technologies that are and will have the greatest impact are 3D printing technology, biotechnology, new material technology, automation technology, robotics,...

The Fourth Industrial Revolution or Industry 4.0 is the current trend of automation and data exchange in manufacturing technology. It includes physical networks, the Internet of things, and cloud computing.

Industry 4.0 facilitates the creation of smart factoriesor or digital factories. In these intelligent factories, virtual spatial physics systems will monitor physical processes, creating a virtual copy of the physical world. With IoT, these virtual spatial physical systems interact with each other and people in real time, and through IoS, users will be involved in the value chain through the use of these services.

Industry 4.0 feature is the real-life virtual production systems (Cyber-Physical Systems (CPS)) by Dr. Jame Truchat, CEO of National Instruments, introduced in 2006. In it, smart products are packed with sensors to tell machines how they need to be handled; processes

will be autonomous within a modular hierarchy. Smart embedded devices work together wirelessly or through the "cloud".

The main motivations of this new industrial revolution are the changes in user expectations (product on demand and Internet time delivery), along with the convergence of new technologies such as the IoT, collaborative robots (with people), 3D printing and cloud computing, and the emergence of new business models. The world is witnessing a series of scientific breakthroughs and technological advances, these are the trends and driving forces that lead the 4th Industrial Revolution.

The major trends in technology can be divided into three groups: Physical/tangible, digital and biological. All three are closely related to each other and with other technologies to benefit each other based on the discoveries and progress of each group.

(1) Physical / tangible:

The four main representatives of the most noticeable major trends in technology development are: Self-driving cars, 3D printing, Advanced Robotics, New Materials.

(2) Digital

Since the Fourth Industrial Revolution, the convergence between physical and digital applications has been the emergence of IoT. In the simplest description, IoT can be considered as the relationship between things (products, services, places,...) and people through different connected technologies and platforms.

(3) Biology

Innovations in biology in general and in genetics in particular are staggering. In recent years, we have been successful in reducing the cost and making it easier to interpret the genome and, more recently, the activation or modification of genes. Next is synthetic biology. This technology will give us the ability to customize our bodies by repairing DNA.

It can be seen that the premise of the Fourth industrial revolution is mainly the foundations for imaging technology in which the digital platform plays an important role combined with iodine technology (Internet connecting things), contributes to bringing imaging technology closer to all fields in social life, in which education and training are the focus areas, inheriting and effectively using the achievements of Imaging technology in the present stage.

2.2. Application of image technology in education and training

Imaging technology is an area associated with the development of technology. It can be seen that the development conditions of information technology have a direct influence on the development of imaging technology.

2.2.1. Some theories about the application of information technology in education and training

The emergence and strong development of Information Technology (IT) had a profound impact on almost every profession in society, including education.

During the last century, Hawkridge (1990) [1] pointed out four common fundamental reasons for the integration of information technology in education. Similar rationale was identified by Selwyn (1999) [2] and Kozma (2008) [3], namely:

Economic reasons: IT skills development is essential to meeting the needs of a skilled workforce, so IT learning is related to future jobs and careers;

Social reasons: All students should know and be familiar with computers in order to become responsible and knowledgeable citizens;

Educational reasons: Information technology is considered as a supporting tool to improve teaching and learning;

The catalytic reason: Information technology is expected to accelerate educational innovation.

The impact of IT on education is reflected in three aspects: Information technology is taught as a subject in schools, the application of Information Technology as a support tool to improve teaching and learning, and IT application in management. However, the success of ICT in education is primarily determined by the policies of the governing agency.

The role of information technology is recognized in education and training with the fact that information technology becomes a subject in schools that is taught throughout the education system from the Primary School to High School and Higher Education. Informatics is a compulsory subject that is both theoretical in nature and provides essential skills important in the context of the development of the industrial revolution 4.0.

The content of IT teaching in Universities has also changed. Before 2006, Informatics was focused on theories such as algorithms and programming languages such as Logo, Basic, Pascal. But from 2006 to present, informatics is taught in the increasing application-oriented direction such as word processing, table calculation, graphic application, games, internet exploitation, multimedia processing.

The new national education program (2018) is a qualitative change in the field of informatics education in schools, in which Computing becomes the official subject and starts from grade 3. In particular, the content of Informatics subject is also built with three areas of knowledge: IT Application, Computer Science and Digital Education.

Informatics has been taught in high schools since 2006 as an elective with a very good effect on social awareness and students and ability to use IT, creating a good base for IT application deployment in Higher education.

2.2.2. *Overview of image technology application in education and training*

The concept of imaging technology can be approached based on simulation definition.

Image technology is the application of technology *(method, technique)* combined with existing materials to create, copy, archive images.
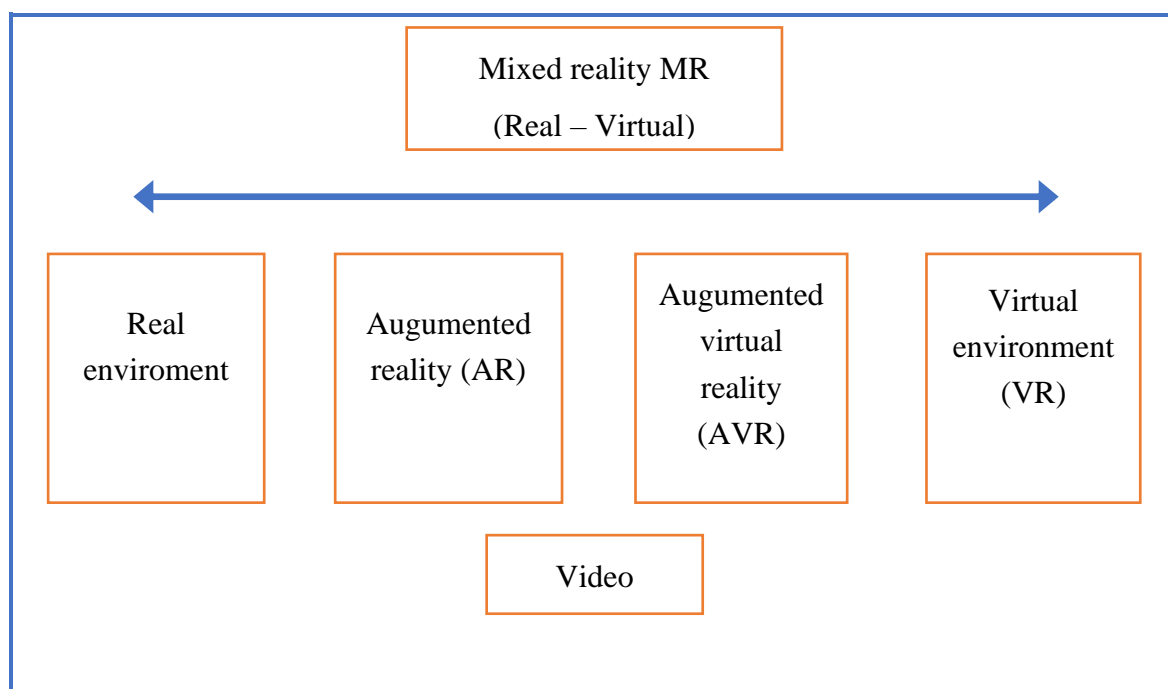
Image science is an interdisciplinary field of study *(physics, mathematics, electronics, computer science, cognitive psychology, imagination)* studying creating, collecting, copying, analyzing, modifying and visualizing images, even images that cannot be detected by the human eye (*Joseph P. Hornak,* [5]).

Multi-dimensional imaging technology is an imaging technology that represents a multidimensional space *(hyperspace image)* has a number of dimensions more than 3, represented mathematically with a number of coordinates more than three. 2-dimensional (2D) videos/photos include length and width for television images/videos. Videos/holograms (3D) include length, width and depth, which are images that are seen and perceived with the naked eye as if in real life. The concept of 4 dimensions (4D) is a mathematical extension of the concept of three-dimensional or 3D space, which is a mathematical model set from 4 dimensions. *x, y, z, X (X is the axis perpendicular to all axes and is called the X axis).* Now, many scientists have discovered more dimensions *(5 pm, 6 pm, 7 pm, 8 pm, 9 pm, 10 pm, even Stephan Hawking's theory M (quantum theory) also showed the 11-dimensional space of the Universe).*

In this research range, the imaging technologies used include: virtual reality (VR-Virtual Reality), technology augmented reality (AR) Augmented reality, based on technology platforms. 360^0 video to create a multi-dimensional interactive visual space with geospatial coordinates and tag information. Basically, the application model in this research is based on the choices depending on the specific conditions and context of each unit to design, develop and apply on a digital platform. In which, 360^0 video images tagged (*Tag*) rich information that supports teaching and experience. The product can be run on the Web-App platform, on computers or on portable mobile devices (*Smartphone, iPad, Tablet, Phablet*).

Virtual reality (*Virtual Reality* - VR) is a powerful support tool in today teaching. In the classroom, virtual reality can allow learners to access and interact with real or non-real (simulated) objects and environments such as immersive experiences (*immersive*), reliving in historical events, moments or practising scientific experiments in environments that

recreate the scenarios of the training program or individual needs. This solution essentially promotes exciting experiences, increases motivation, enhances concentration and stimulates learning activeness, performs creative, inspiring learning activities and tasks.

Mixed reality MR (Real – Virtual)

Real enviroment	Augumented reality (AR)	Augumented virtual reality (AVR)	Virtual environment (VR)

Video

Scheme 1. *Frame for interactive photo technology*

This technology has been studied and widely applied education and training (according to specific programs, oriented for skill training, manipulation), and vocational training. Since 1997, Robertson, G. [6] have launched immersive experiments in virtual reality technology on the Desktop, initially laying the foundation for the ideas of applying virtual reality technologies in education. By 2018 Parong, J. and Mayer, RE [7] have published research results on learning science subjects in high school using virtual reality technology. *Feng et al* [8] has built an immersive virtual reality game in education, designing lessons with VR glasses. Wang, P et al [9] gave the results of studying some lecture design principles with VR glasses to ensure the safety of people wearing glasses to participate in learning. Chen, Y.-L. and colleagues [10] analyzed the effects of applying virtual reality technology in the development of language and cognitive abilities for students. Hu, X., Su, R. and He, L. [11] also published the research results of designing educational games using 3D simulation games integrated in VR glasses.

Augmented reality (Augmented Reality - AR): Basically AR technologies use devices connected with technology solutions that allow embedding or mixing real environments with

virtual environments in the direction: Coexistence, hybridization, integration (This technology is also known as *Maker based* - based on technology of marking and attaching information). With diverse integrated solutions (in real - virtual environments), AR can easily combine freely available content and access services from multiple platforms, via the internet (text, audio, audio, video, graphics, 3D, simulation). AR technology allows to run on both Web and mobile App platforms (applications on mobile devices, handsets), allowing flexible, anytime, anywhere access to content for learners, real display in real time, synchronously or asynchronously (*Synchronous/Asynchronous*)

Video 360^0 technology: Being shaped and developed around 2016, Video 360^0 really becomes a viable solution and is widely integrated in many areas of image support. Video 360 can be defined as a form of video that captures images in all directions around the camera at the same time. Users can interact with the video, select scenes, move images, or navigate through gestures to see every 360 degree from the video. Video 360^0 allows to create a true feeling of every angle (360 degrees) of an object or panorama around, creating a rich immersive experience.

VR technology, AR (forming *Mixed Reality* - MR) on Video 360^0 platform support to build a strong virtual-reality learning environment, promote cognitive processes, forge skills and develop learner competencies. The integration of these technologies to create digital resources according to the output standards of the training program and at the same time supports students with flexible access, anytime, anywhere, on any device, with all subjects user interaction.

2.2.3. The role of imaging technology in education and training

Imaging technology is used in the education and training sector with some of the following basic roles:

Teaching planning: Contents of training programs are arranged, planned using technology approach, allowing flexible teaching modules. *(theory, practice, assessment, self-study, self-study, communication, discussion, etc.);*

Digitalized materials, increasing the ability to access and distribute multi-formats, use and reuse in a flexible, vivid, attractive way with any device (*Mobile handset, computer*); support for teaching discovery and experience; easily customizable according to individual needs, interests and abilities; promote adaptive and personalized teaching, mixed teaching, and reverse teaching.

Check out the real reviews support (*Authentic assessment*), process evaluation and review; integrating testing and evaluation as a creative experiential teaching activity, teaching problem solving in real situations *(Problem/ Location/ Situation-based learning);*

Open learning environment: supporting the creation of a virtual-reality learning environment in which learners truly become the center of their own learning;

Multi-modal teaching (*Multimodal learning*): Increase attention, multi-sense in the teaching process, practice skills in a context similar to or close to reality, learn through action experience, through game of discovery.

2.3. Applying image technology in tradition and culture education of Hanoi people, the situation and solutions in the industry 4.0

2.3.1. The relationship between the application of image technology in the field of traditional cultural education of the Hanoians

Multi-dimensional imaging technology is an imaging technology that represents a multidimensional space *(hyperspace image)* has a number of dimensions more than three, represented mathematically with a number of coordinates more than three. 2-dimensional (2D) videos/photos include length and width for television images/videos. Videos/holograms (3D) include length, width and depth, which are images that are seen and perceived with the naked eye as if in real life. 4-dimensional concept (4D) l à a mathematical extension of the concept of three-dimensional or 3D space, is a mathematical model set from 4 dimensions *x, y, z, X (X is the axis perpendicular to all axes and is called the X axis).* Now, many scientists have discovered more dimensions *(5 pm, 6 pm, 7 pm, 8 pm, 9 pm, 10 pm, even theory M (quantum gravity theory) of Stephan Hawking also showed the 11-dimensional space of the Universe).*

Traditional culture is popular, stable, crystallized in the life of a community and handed down from generation to generation through socialization. Traditional culture manifests in many different aspects: Material and spiritual, physical and intangible, both in infrastructure and superstructure of society. Spiritual culture is expressed in ideology, psychology, personality, lifestyle and habits of the community and nation. Culture is a human product, associated with the movement of social reality and has historical character.

The feasibility of applying imaging technology in the education sector is shown in the suitability of each technology (due to its characteristics) with educational activities to which that technology is applied. Additionally, the infrastructure conditions for implementing the solution are feasible.

With features that can allow learners to access and interact with a simulated environment, help learners have interesting experiences, have opportunities to perform creative learning activities and tasks. From a technological perspective, the application of image technology in the education and cultural fields is completely appropriate and feasible.

2.3.2. Applying imaging technology in the field of traditional cultural education of Hanoi people

Practice from the perspective of the manager in the use of image technology in the field of tradition and culture education of Hanoi people

First of all, in terms of policy mechanisms, it can be seen the consistency in executive management policies from the central to local levels, particularly in Hanoi, in the general IT application deployment, especially imaging technology in particular in the simulation of the traditional cultural space of people living in Hanoi.

In terms of cultural management and administration, Decision No. 2754 / QD-BVHTTDL dated September 15, 2020 attached to the plan of the Ministry of Culture, Sports and Tourism on implementing specific work to proactively integration of the 4th Industrial Revolution, clearly stating the policy of developing digital tourism, digital culture and developing human resources and technology. In terms of digital tourism development, the above plan states: Research and develop digital tourism development projects; in the immediate future, to give priority to developing smart tourism in Hanoi; Smart tourism development based on research and application of new technologies to support and improve tourism experience in tourist cities. In the aspect of digital culture policy, to study and develop projects on the development of digital culture industry, in which priority is given to a number of fields, especially the field of cultural tourism. In terms of policies on developing human resources and technology, innovating teaching methods based on the application of digital technology; encourage new educational and training models based on digital platforms.

In terms of education management, implementing the Prime Minister's Decision No. 749 / QD-TTg dated June 3, 2020 approving the National Digital Transformation Program to 2025, with a vision to 2030; Decision No. 117/QD-TTg dated 25/01/2017 of the Prime Minister approving the project & quot; Strengthening the application of information technology in management and support of teaching - learning activities, scientific research to contribute to the part of improving the quality of education and training in the 2016-2020 period with a vision to 2025; Directive No. 666/CT-BGDĐT dated August 24, 2020 of the Minister of Education and Training on the tasks and solutions for the 2020-2021 school year of the Education sector, instructions No. 4003/BGDĐT-IT on performing the tasks Information Technology (IT) Department of the school year 2020-2021 of the Ministry of Education and Training clearly stated one of three key tasks, that is: "Strengthening the application of IT in innovating content, teaching and learning methods. , exam and assessment, education management, school administration; applying online teaching and learning; *to develop digital data storage for the whole industry* , online shared question bank,

e-learning lecture store connected with digital Vietnamese knowledge system". Some specific tasks: Promote the application of IT to support innovation in content, teaching, learning, exam and evaluation methods in all subjects; Implementing e-school solutions, *Electronic classes*; Direct schools and teachers to actively build online teaching materials, *focus on building 3D materials*.

In terms of operating policies of Hanoi city, *Plan No. 85 / KH-UBND* on the Hanoi Information Technology Plan 2020, outlined groups of solutions, including specific solutions related to the practical basis of the policy mechanism of image technology application. In the group of solutions to ensure IT human resources: Renovating programs, content, training modes, fostering, promoting the application of training forms, *Online training online*; Strengthening coordination with Universities training and fostering advanced and specialized skills in IT; *Research, develop training programs related to 3D technology, virtual reality and organize pilot training for middle and high school students of the City as the foundation for resource development. IT human resources in the next 10 to 15 years* .

Therefore, it can be said that imaging technology has had an important position, being specifically named as one of the contents that need to be implemented in executive documents on IT applications of institutions. management management in 2020 and in the future. This is one of the important practical foundations, ensuring the consistency between the academic content and the practicality of the topic.

Practice from the management object in the traditional cultural education of Hanoi people

Along with the trend of developing cultural education in Hanoi according to the standards of a smart city, the application of modern technologies to transmit, educate and promote the cultural beauty of Hanoi people is a urgent requirement. Based on the outstanding advantages of multi-dimensional interactive image technology such as: preserving authentic images, good interaction value, long-term preservation, integration with international information networks; can be used in many different spaces and forms of education; one-time cost, value for use many times, no need to reprint; Imaging technology is a good choice for traditional cultural education of Hanoians.

Using technology materials in addition to serving the purpose of centralized education also promotes public open education. Through images transmitted on the Internet, in forums *(forum)*, is an inactive way of implementing education *(Passively absorb educational content through images)*. This is a new educational trend and an effective method to promote Hanoi cultural traditions to the community about cultural education of Hanoi people values. The online training platform for a smart classroom (Figure 4) is in need of intelligent, interactive digital learning materials to help learners have more dynamic access to learning content.

Hanoi Metropolitan University is the only public non-business unit in the field of Higher education and training directly under the People's Committee of Hanoi city with the function of training quality human resources, meeting the demand for socio-economic development of the Capital and the country. With the mission "Connecting and developing the tradition of Hanoi capital for thousands of years of civilization by pursuing specific activities with outstanding quality, training high-quality human resources, meeting the needs of economic development - the society of the capital and the whole country". The application of image technology in simulating some traditional cultural spaces of Hanoi people is a specific task for Hanoi Metropolitan University to realize its mission, at the same time as a real basis important practices contribute to the success of the application of information technology in traditional cultural education for Hanoi capital.

Therefore, it can be seen that the application of image technology in the field of tradition and culture education in Hanoi city ensures feasibility as well as suitable with the development context of Industry 4.0. In which, the role of non-business units, including Hanoi Capital University, needs to be shown and promoted drastically in order and systematically contributing to promoting the application of imaging technology in the current period.

3. CONCLUSION

Industry 4.0 with technological achievements is affecting greatly all the field of life and social culture. Within the range of the article, the author focuses on the theoretical basis of the technology of image technology, the context of the 4.0 revolution and the problems posed in the application of image technology in the issue of cultural education Hanoi's traditions, contributing to preserving traditional and cultural values as well as international integration for Hanoi Capital in the current stage.

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ỨNG DỤNG CÔNG NGHỆ HÌNH ẢNH TRONG TRONG GIÁO DỤC VĂN HÓA TRUYỀN THỐNG CỦA NGƯỜI HÀ NỘI TRONG BỐI CẢNH CUỘC CÁCH MẠNG CÔNG NGHIỆP 4.0

Tóm tắt: Công nghiệp 4.0 với những thành tựu công nghệ đã tác động rất lớn đến lĩnh vực đời sống và văn hóa xã hội. Bài viết này tập trung vào cơ sở lý luận về công nghệ hình ảnh, bối cảnh của cuộc cách mạng 4.0 và những vấn đề đặt ra trong việc ứng dụng công nghệ hình ảnh trong vấn đề giáo dục văn hóa truyền thống của người Hà Nội nhằm góp phần bảo tồn các giá trị văn hóa, truyền thống đối với quá trình hội nhập trong giai đoạn hiện nay.

Từ khóa: Công nghệ hình ảnh.