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Research Paper

Opportunities and Challenges of Applying Technology In Education In Ethnic Minority Areas In Vietnam

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Abstract
As a multi-ethnic country, Vietnam is facing the problem of unequal educational development, with a large gap among advantaged, developed regions and ethnic minority, remote and isolated areas - where natural conditions are more difficult, material facilities are still lacking... Although there have been many policies and projects supporting education, these limitations have not been eliminated. Fortunately, the development of technology has brought new opportunities, promoting the improvement of the quality of education in ethnic minority areas and overcoming the existing difficulties. However, where there are opportunities, there are risks and vice versa. Grasping opportunities and limiting risks when applying technology in education will help education in ethnic minority areas have the opportunity to shorten the gap in education quality as well as access to technology and move towards ensuring equity compared to advantaged areas.

Keywords: *Technology, technology in education, ethnic minority areas.*

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I. OVERVIEW OF APPLYING TECHNOLOGY IN EDUCATION

1. In the world

The Industrial Revolution 4.0 began in 2011, in Germany and then gradually spread to countries around the world. The Industrial Revolution 4.0 spread throughout the world as it is today because in fact, the speed of development and the impact of breakthroughs in technology have had unprecedented strong influences. Inventions and scientific advances are present in all aspects, such as artificial intelligence (AI), Robotics, Internet of Things (IoT), Chat GPT... affecting all areas of social life, culture, health, education, and economy of countries. And in the context of globalization, there are even higher requirements for countries to improve their endogenous capacity to absorb and master advanced technology combined with the creation of new products, services, and technologies to improve productivity and quality of products and services with high added value. That is also the reason why the world is increasingly witnessing the growth of "technology giants" such as Apple, Microsoft, Nvidia with global influence.

The research of OECD[1] has pointed out 7 breakthrough factors in the current context including: (1) The appearance of technology everywhere; (2) Data storm; (3) The diversity and rapid change of the young generation; (4) The changing nature of jobs; (5) Artificial intelligence, cognitive computing and robots; (6) Automation in work; (7) The explosion of the contingent workforce. Of these 7 breakthrough factors, 4 factors directly belong to technology.

It can be seen that the Industrial Revolution 4.0 is wearing away the gap between the real world and the virtual world through advanced technologies, constant innovation and creativity with very fast, breakthrough developments, profound and multi-dimensional impacts on a global scale. Electronic and technological devices are becoming more and more popular in every family, individual and the significant increase in access to

[1] OECD (2018), "A Brave New World: Technology and Education", Trends Shaping the Education Focus, No. 15

technology is very clear. Looking at what technology brings, it can be clearly seen that this is a non-stop operation process of many people to bring a more modern and convenient life.

For education, the United Nations Educational Scientific and Cultural Organization (UNESCO) believes that: Technology has changed the education fundamentally and comprehensively, systematically and highly integrated in the early 21st century. The explosion and development of technology in education has created non-traditional educational methods, educational methods and educational models based on technology that have been strongly promoted and spread in many countries around the world such as: smart education, smart schools, digital schools... This process leads to the necessity to re-evaluate the value and meaning of teaching (education in general) from the perspective of the relationship between the development of technology and changes in the nature of the implementation of educational programs.

It is not contingent that in the process of finding the abilities to reconcile social requirements with the satisfaction capacity of schools, the provided learning opportunities and the requirements for personal development, technology (first of all, it is information technology) is always prioritized as an important and feasible solution because technology brings equality in access and is suitable for diverse and unlimited demands on education, access to new knowledge; meets the requirements for new competencies of learners in the 21st century as well as new professional competencies and the ability to adapt to the educational process for everyone, for each person and lifelong learning... In the current context, the components that constitute an educational process and education needs to be viewed in a dialectical relationship between the accumulation, enrichment and sharing of information and knowledge to serve "smart learners", "digital citizens" as well as "smart schools", "digital schools". To adapt to the development of technology, schools have invested in equipment and put into use, exploited many modern teaching facilities and equipment to serve the management and operation of schools as well as organize the teaching and learning inside and outside the school, direct teaching as well as online teaching. And of course, the innovation in teaching methods to suit new requirements, suit new teaching facilities is also increasingly widely interested.

In the technological world at present, children - pupils use technology devices and connections more than ever. According to a report from OECD (2017), from 2006 to 2015, the rate of 15-year-old children in OECD countries with access to the Internet at home increased from 75 - 95%. Similar results were also seen in the households in European Union (EU), with Internet access rate increasing from 55% in 2007 to 87% in 2017 (Eurostat, 2018). Children/pupils are using technology for countless activities both in and out of school. Young people use digital devices for many purposes, from watching television to playing games, chatting to doing studies for school activities. Online development services such as Netflix and Amazon Prime are rapidly gaining popularity as time spent in front of traditional television sets increasingly declines. YouTube has become the viewing platform which is especially chosen for children aged 8-11. Technology is a reality in the lives of children/pupils in the 21st century. The way that children seek information, exchange, play and learn is all influenced by the increase of new technologies. Data shows that children/pupils are accessing the internet more frequently, for longer periods, at younger ages, on more devices, and for different purposes. Despite the opportunities the internet offers, there are accompanied risks and not all children/pupils can benefit equally from the potential online opportunities.

2. In Vietnam

The technology revolution 4.0 has been present in life, along with that, the strong development of technology and the ability to be widely applied in all fields, have contributed significantly to promoting the socio-economic development of Vietnam. Technology groups such as Apple, Microsoft and NVidia have committed to invest billions of US dollars in many countries in the region and Vietnam is a strategic market for many companies which want to expand in Asia. This result is achieved primarily thanks to the Government's policy mechanism, which is one of the driving forces attracting international technology companies to Vietnam, helping to create new opportunities in the domestic market, thereby opening up new opportunities for companies to develop operation and expand business. In addition, human resources are also a factor that makes Vietnam attractive to any technology company. According to BIIA's report, Vietnam is currently receiving a large number of IT graduates, with more than 57,000 people participating in the job market every year and more than 400 universities offering courses related to science and technology, including artificial intelligence, cloud and big data. Vietnam is currently also witnessing the growth of many big technology groups such as Samsung Vietnam, LG Vietnam, Viettel Telecom Corporation... not only contributing to the development of people's lives, the socio-economic development of Vietnam but also demonstrating the competitiveness and innovation capacity of the technology industry in the region.

To proactively exploit the opportunities brought by the Revolution 4.0, Vietnam is one of the countries that have early issued a program, strategy on national digital transformation, becoming a country with awareness of digital transformation along with advanced countries in the world. The contents of digital transformation of countries are different, depending on the socio-economic development strategy of each country. However, in

general, they all aim at digital transformation on 3 pillars: Digital Government, Digital Economy and Digital Society. In Vietnam, social digital transformation (digital society) focuses on applying technology - especially digital technology to improve service quality, reduce social gaps in the fields of education, health, culture, social security and safety, especially in ethnic minority and mountainous areas.

For education, Vietnamese Government and Ministry of Education and Training, in the policy-making process, always consider technology in general and digital technology in particular as key factor to promote educational development, from comprehensive national policies to specific projects that have contributed to improving the quality of education and the digital transformation process to successfully implement the sustainable development goals of the United Nations.

Vietnam has made many efforts to bring technology into education, deploying many online teaching programs, distance learning, and applying software to support teaching and learning to improve the quality of education and create favorable conditions for learners. In planning the policies and strategies, paying much attention to vulnerable groups such as ethnic minority children and children with disabilities has always been one of top priorities of Vietnam.

Vietnam also identified the application of technology in education as a key task to implement the 2018 General Education Curriculum as well as the Digital Transformation roadmap of the education sector. To efficiently implement the application of technology in teaching and learning, the Ministry of Education and Training (MOET) has proactively and actively advised and issued documents to create a legal corridor and favorable conditions to promptly implement tasks on technology application and digital transformation associated with each specific task and time. At the same time, MOET has directed localities and DOET to seriously and flexibly implement the application of technology in teaching and learning organization as well as the administration of educational institutions. Concurrently, the MOET has promptly directed the assurance of fundamental factors for the application of technology and digital transformation in education such as development of infrastructure and human resources. The investment in infrastructure, equipment, Internet, teacher training and improvement, provision of open learning material stores, management software, teaching and learning software, learning of IT subject... has contributed significantly to improving technology skills for managers, teachers, staff, and pupils to use and exploit more proficiently and efficiently as well as to have a mindset ready to participate in the technological environment and digital environment. The application of technology has created many changes in general education, helping the education sector improve management efficiency and quality in teaching and learning. Thanks to the application of technology that has been deployed synchronously and actively, the education sector has also changed a lot, promoting an open education, learning at anytime, anywhere, and lifelong learning.

In 2020, the Prime Minister promulgated Decision No. 749/QD approving the "National Digital Transformation Program to 2025, with a vision to 2030", which identified Education as one of the eight fields that firstly need to be prioritized for digital transformation , specifically: "Developing a platform to support remote teaching and learning, thoroughly applying digital technology in management, teaching and learning; digitizing documents and textbooks; building a platform to share teaching and learning resources in both direct and online forms. Developing technology to serve education, directing towards personalized training. 100% of educational institutions implement remote teaching and learning. Applying digital technology to assign homework and check pupils' preparation before coming to class'. Thus, there are two main contents that need to be focused on in digital transformation, which are: Digital transformation in management and digital transformation in teaching, learning, testing and evaluation.

Determining that inevitable requirement, the MOET has promptly promoted the application of technology and digital transformation throughout the sector and promulgated Decision No. 366/QD-BGDDT dated 24 January 2024 on the Plan to enhance the application of IT and digital transformation. These are important legal bases, serving as the basis for further promoting the deployment of technology application in general and digital transformation in particular in the sector to innovate teaching methods, innovate management work, as well as improve the quality of educational activities to direct towards sustainable development; contributing to training quality human resources, ensuring economic development.

In the school year 2023-2024, the entire education sector continued to apply IT, promote digitalization, build a database of education sector, and connect database of the education sector with national databases. Up to now, the MOET has completed the construction of 100% of the database of nearly 22,000 educational institutions and independent child groups; nearly 500,000 teacher records and more than 5 million child records; General education and general education databases, digitizing data of more than 28,000 educational institutions; more than 800,000 teacher records and more than 18 million pupil records. Updating and completing identification information on the Database of Education sector and synchronize about 24.55/25 million electronic records of pupils, teachers and managers of education sector with the national Database on population and information on the education and training sector; standardize records of staff and officials and synchronize data with the national Database on staff, public servants and officials (managed by the Ministry of Home Affairs).

With the support of the Ministry of Public Security in updating and sharing data on candidates' permanent residence profile (in 2024, the data of 760,000 pupils was connected) with the database of the education sector, 100% of schools have exploited and used this data online for the recognition of high school graduation and many ethnic boarding schools exploited it for admissions, without using permanent residence confirmation. This is also a huge benefit from the national population database supporting the education sector, especially for ethnic minority and mountainous areas.

Up to now, 100% of educational and training institutions have connected to high-speed internet, 90% of educational institutions use management software, most of which are online management software. The digital learning resource store igiaoduc.vn has provided more than 9,130 E-learning lectures, more than 2,000 video lectures on television, 200 virtual experiments, 35,000 multiple choice questions, nearly 200 textbooks according to the general education Curriculum for pupils and teachers to refer to use, meeting the demand of online teaching and learning. In addition, general education institutions have proactively built and put into use in teaching and learning nearly 1 million digital learning materials (including E-learning lectures, presentations, textbooks, videos, virtual experiments, etc.). Communication channels such as: Web portals, Fanpage on social networks, Zalo, YouTube are reviewed, adjusted, exploited, and improved the efficiency of information and communication about the sector on Internet and mobile communication networks. In which, the web portal of the MOET is constantly upgraded, from interface to technical infrastructure, to ensure meeting the increasing requirements in providing information for direction and operation of the Ministry to the whole society; at the same time, providing official information on Education and Training for information and communication agencies to exploit and use. Currently, 63/63 DOET nationwide have web portals/websites.

Some websites and software actively support the management such as: VNEdu software, SMAS, sector Database http://csdl.moet.gov.vn; Regular training of the MOET http://taphuan.csdl.edu.vn, Public servant assessment software ETEP, TEMIS... Software commonly used in teaching, testing and evaluation such as: Software to create and present electronic lectures; Virtual experiment software; Multiple choice test scoring software such as Mr Test, TN trac nghiem; Applications such as Google Form, Google sheet... Software for online teaching, testing, and online meeting evaluation have been used such as: Microsoft Team, Zoom, Google meet, K12 Online, ..

The whole sector continues to efficiently deploy the emulation movement "Innovation and creativity in management, teaching and learning" for the period 2020 - 2025 of the MOET and the emulation movement launched by the Prime Minister "For the poor - Noone left behind" associated with the development of education for pupils in ethnic minority and mountainous areas, many educational institutions have concretized the emulation movement to suit the reality of the unit, typically: creativity and innovation in management, teaching, scientific research with the motto "Every class hour is a step forward in teaching, every day at school there is an innovation in work". In particular, the movement "Application of high-tech equipment to innovate teaching and learning methods" has spread many new ideas in management, teaching and learning, contributing to improving the quality of education and staff.

II. RESEARCH CONTENT

2. Opportunities of applying technology in education in the ethnic minority areas

As a multi-ethnic country with 54 ethnic groups, including 53 ethnic minorities, with nearly 14 million people (accounting for about 14.3% of the country's population), mostly live in mountainous, remote, isolated and extremely disadvantaged areas; however, Vietnam welcomes the Industrial Revolution 4.0 with a ready, flexible and adaptive mindset within the permissible conditions and capabilities. With the domestic and international context as analyzed, ethnic minority areas in Vietnam face opportunities to apply technology to improve the quality of education and shorten the gap in access to technology, directly towards ensuring equality for everyone and all ethnic groups.

2.1. Special attention from the Government to ethnic minority areas

The ethnic policies and guidelines of the Party and State have shown Vietnam's efforts in ensuring equal rights and development opportunities for ethnic minorities and mountainous areas, including the right to access and enjoy scientific and technological advances. In that context, the application of technology in education in the ethnic minority areas with opportunities to take advantage of and keep up with the trend of the Industrial Revolution 4.0, improve the quality of management, teaching and learning in schools; and grasp and adapt to the current global changes.

When the concept of "digital transformation" was of interest, the Committee for Ethnic Minority Affairs proactively developed the project "Strengthening the application of IT to support ethnic minorities in socio-economic development and ensuring security and order in ethnic minority areas in Vietnam in the period of 2019 - 2025". The project was approved by the Prime Minister in Decision No. 414/QD-TTg dated 12 April 2019,

focusing on promoting the application of IT (IT) to support ethnic minorities in accessing information; upgrading the IT platform to serve the state management of ethnic minority affairs from the central to local levels; propagating, disseminating, improving awareness about the application of IT for ethnic minorities and improving the capacity of technology application for people working in ethnic minority affairs.

The special attention of the Government, Ministries, Departments and Branches is one of the particularly important opportunities for ethnic minority areas, and is the legal basis for accelerating the application of technology to socio-economic development in general and education development in particular.

2.2. Taking advantage of factors ensuring the application of technology from the national digital transformation program for education in ethnic minority areas

Digital transformation is an important task, contributing to the efficient implementation of the National Target Program for socio-economic development in ethnic minority and mountainous areas. Implementing national digital transformation through Projects, many communes in region III and extremely disadvantaged hamlets in ethnic minority and mountainous areas across the country have been set up support points for application of IT, connected to the national power grid, covered by the Internet, and have access to and use modern technology devices such as smart phones, tablets, etc. In particular, some border areas are still "lowlands" in terms of telecommunications waves, many localities have determined to implement the campaign of "carrying waves" to the border. However, digital transformation does not stop at installation, new construction or upgrade of technology infrastructure, but also the matter of changing the awareness and technological skills of ethnic minorities in their lives and production. It can be said that the current national digital transformation program is bringing good opportunities for education in ethnic minority areas because among them, there are many pupils' parents who have knowledge and skills in technology, so they can coordinate with schools more conveniently in managing and educating their children. At the same time, they can guide the kids on how to use and exploit technological devices for learning as well as create learning conditions for them in interrupted conditions such as epidemics, natural disasters or conditions of terrain separation and harsh weather in ethnic minority areas.

2.3. Promoting the successes of digital transformation in education to improve the quality of education in ethnic minority areas

We do not need to wait until an available national digital transformation program, digital transformation in education for the application of technology in education to take place, in fact, this is always the task set by the MOET in the school years for localities and educational institutions. But perhaps when digital transformation in education becomes a common requirement of national digital transformation, the influence of promoting the application of technology - especially digital technology - becomes so strong and drastic. With the existing conditions in schools such as Internet, computers, projectors, smart TV sets, computer rooms, system of management software, teaching and learning software... along with the teachers' technology skills that are annually improved and trained, combined with other educational institutions in each locality to create a widespread and synchronous educational network across the country thanks to technology connections.

Currently, most (DOET) in ethnic minority areas are implementing educational management software to all educational units from preschool to high school levels; training software was used to regularly train teachers ; TEMIS software was used to evaluate teachers' professional standards every year; managing pupils on electronic records and teacher records including teaching plans, pupil evaluation monitoring books, and educational plans which are all managed in the network environment. Besides, schools are proactive and active in applying technology in teaching, learning, testing, and evaluation; bringing positive results such as: deploying the provision of popular courses in open online form for all subjects to improve access to technology-based education such as training on implementing the 2018 General Education Curriculum; deploying digital platforms to share teaching and learning resources, creating favorable conditions for all subjects to access such as digital platforms https://igiaoduc.vn/, Elearning MicroSoft Teams... to exploit and use in teaching. As taking advantage of the conditions that ensure the application of existing technology in education and the digital transformation program in education, each school and each locality in ethnic minority areas has been creating its own advantages in the "digital age" to satisfy the implementation of the 2018 General Education Curriculum as well as to seize unlimited learning opportunities to help pupils gradually get closer to their dream of accessing knowledge of the era 4.0, contributing to gradually narrowing the inequality in education and technology in education between regions.

In addition to the opportunities mentioned above for the application of technology in education in ethnic minority areas, some other opportunities can be mentioned such as: (i) The readiness to accept new technology trends, educational methods, and educational models associated with technology of managers and teachers; (ii) The quick adaptation and ability to master technological equipment of managers, teachers, pupils and pupils' parents; (iii) The support and contribution of pupils' parents, local governments - communities and businesses in building a technology platform for education... have been bringing to education in ethnic minority areas more opportunities to access technology; opportunities to gradually narrow the gap in educational quality with favorable

areas, directing towards equality in education as well as opportunities to improve awareness, knowledge, and technological skills for managers, teachers, pupils and pupils' parents.

3. Challenges of applying technology in education in ethnic minority areas

Besides its opportunities and benefits, there are also challenges and difficulties that education in ethnic minority areas in Vietnam face, including:

3.1. Low ability to access to technology for ethnic minorities

In general, the lives of ethnic minorities are still difficult, many children have to participate in jobs to earn extra income, help their families, even drop out of school to earn money, the ability to equip and use technological devices is not very popular. The results of the investigation by the Committee for Ethnic Minority Affairs show that radio/cassette is the lowest cost and easiest means of ownership for ethnic minority households. The rate of people using phones, including smart phones, is also increasing, but is still concentrated in ethnic groups with high income such as Hoa, San Diu, Tay, San Chay, Muong. Up to now, the access to computers and the internet for people is still very limited. Si La, Chut, La Hu, and Xinh Mun ethnic groups have less than 1% of households with computers. La Hu, Khang, Kho Mu, Ro Mam ethnic groups... have very few households with computers connected to the internet. In the highlands, to access the internet, one must go to the commune center, the commune cultural post office or public internet service. It can be seen that, although the Party and State have paid great attention, invested in and supported, in general, the technology infrastructure has not been fully built and covered in all ethnic minority areas, has not reached all households, limiting the ability of people to access, approach and exploit technology. Along with that, people's awareness is still limited, they still have thinking of relying on the investment and support of the State, so they have not proactively equipped themselves with technological equipment and knowledge. This also leads to that fact that pupils have been limited to access to technology to support their learning from family as well as causes difficulties and obstacles in connecting information among schools, teachers and pupils' families.

3.2. The quality of technology human resources has not met

One of the requirements to satisfy the Industrial Revolution 4.0 is to improve human capital resources to be able to meet the requirements of knowledge and skills that are constantly changing in the new working environment. This poses a great mission for Education and Training to prepare a workforce that meets the development requirements of the country. However, the technology human resources of ethnic minority areas are still lacking in quantity and weak in expertise, not fulfilling the requirements of the job. This fact is a big challenge for education in ethnic minority areas when the knowledge and technology skills of a part of managers and teachers are still limited, causing a significant impact on the innovation of learning methods and forms and slowing down the progress of the requirements of educational innovation.

Although the MOET and DOET provide annual training and professional improvement, not all managers and teachers have enough knowledge, skills and enthusiasm to apply technology to their work. There are 02 main reasons related to the deployment of technology application in teaching activities in schools:

(i) For subjective causes: Managers and teachers do not have full awareness of the importance of applying technology in teaching, still have subjective thinking and the habit of "teaching by rote", a number of people are old, so they are afraid of innovation and change;

(ii) For objective reasons: Material facilities, equipment, and technological infrastructure serving educational activities are still lacking, only temporarily meeting a certain part of the requirements and not yet synchronized in educational institutions. The equipment that has been equipped in schools, in normal classrooms, and in IT rooms is often broken and unusable; the warranty, maintenance, upgrading, and replacement are not regular, so technological equipment is degraded, causing difficulties for users.

In some educational institutions, the application of technology in education is still in the nature of "modeling", model teaching, and sample teaching… In addition, the low rate of schools teaching informatics also affects pupils' ability to access computers and the internet. According to the report data of ICT index[2], some provinces with a large concentration of ethnic minorities have a low rate of schools with IT rooms are: Dien Bien, Bac Kan, Quang Ngai, Ninh Thuan, Kon Tum, Bac Lieu, Binh Phuoc...

3.3. Unfavorable natural conditions

Ethnic minority areas have rugged terrain, with potential dangers, and many places lack basic transport infrastructure such as bridges and roads, making travel very difficult. These natural conditions also make it difficult to install and build technological infrastructure to serve the economy - society as well as education.

[2] Ministry of Information and Communications (2022), Report on the readiness index for the development and application of information technology and communications in Vietnam in 2022

According to a report from the MOET, in the school year 2023-2024, the internet has covered all educational institutions, but schools were almost not covered. The equipment of technological devices such as computers, projectors, and smart TV sets was only available in main schools (some schools have equipped enough equipment for classrooms, some have not). Moreover, ethnic minority areas often have fluctuating, erratic weather, harsh climates, and frequent natural disasters (floods, landslides)… so the installation, repair, maintenance, and upgrading of technological infrastructure and equipment are big challenges. The installation, construction and equipment of technological equipment in ethnic minority areas are already difficult, and become even more difficult in remote, isolated and extremely disadvantaged areas. Therefore, in addition to continuing to invest in the construction and upgrading of technological infrastructure, material facilities and equipment, it is necessary to organize the training and fostering the technological capacity of equipment staff in schools, teachers and pupils; promote socialization in the construction, upgrading, repair, maintenance and replacement of technological equipment as well as plan to allocate expenditure and budgets appropriate to the specific features of ethnic minority areas.

3.4. Risk of falling behind in technology

Not only for ethnic minority areas, remote areas, but also for areas with favorable conditions, the risk of falling behind in technology can also occur because the fluctuations of technology are immediate and rapid, and if we do not catch up, the gap will grow larger.

When the technology infrastructure is not guaranteed - even schools starting from zero, the quality of human resources is not met, investment resources for technology are not strong, the role of leaders and executors have not shown effort and determination... then not catching up with scientific and technical advances as well as widening the gap in access to technology is entirely possible, especially for ethnic minority areas. The great progress of technology is not only the increase in the quantity of many applications, many software supporting management and teaching, but also each application itself has developed and upgraded to more advanced versions, for example, the most popular presentation software, PowerPoint, has now been upgraded with many features and effects compared to the previous old version. Policies have been issued, many projects have been deployed, efforts and difficulties have been overcome so that education in ethnic minority areas nowadays has the technological infrastructure, equipment and machinery brought into schools and applied in teaching. However, the maintenance and development are difficult problem for ethnic minority areas if there are no accompanying conditions. Therefore, the application of technology in education in ethnic minority areas is always at risk of being slower and having a gap compared to favorable areas because the fact of the "technology race" is very harsh, even Vietnam is at risk of falling behind some countries in the region as well as in the world.

3.5. Risks in the internet environment

The benefits that the internet brings are undeniable, but they also have many implicit risks. These risks can come to anyone, including managers, teachers, pupils' parents and especially pupils.

Pupils are the ones who like to use technology and have the ability to use and master technology quickly. But that also makes pupils face risks from technology and the internet environment. Although there are risks in the "virtual world", the loss and damage are real, especially when pupils do not have enough knowledge, skills and experience to identify, prevent and avoid those risks. And these risks can happen to any pupil, not just pupils from ethnic minority areas.

The risks that children often encounter when using online technology and the internet have been summarized by OECD[3] as follows (see Table 1):

Table 1. Summary of risks that children often encounter when being online

Content implemented online	Risks
Search for unsafe information	- Receive advertisements and spam; - Receive pornographic, violent, racist, hateful contents, etc. - Be tricked (money and body).
Contact and share information with people who have similar hobbies and ideas	- Be bullied, harassed or followed; - Be collected personal information and misused personal data.

[3] OECD (2018), "A Brave New World: Technology and Education", Trends Shaping the Education Focus, No. 15, OECD Publishing, Paris

Self-initiate or join, cooperate create content with groups	- Be involved in illegal activities - Create and upload, download harmful materials; - Receive or give harmful advice to other people; - Neglect studies, reduce interaction with real people, real things.

These studies also show that the more pupils are exposed to technological devices and access the internet, the greater the risk. When pupils are actively or passively exposed to unsafe, negative or offensive information, they easily feel insecure, fearful, angry, and even unable to control themselves. Technology has two sides, but when pupils do not have enough knowledge and skills to exploit the good and useful aspects, they are at risk of violating the children's rights. Partly because families and schools have not focused on equipping them with knowledge and understanding of media to guide them in using the internet safely, even in ethnic minority and remote areas, there is a lack of support mechanisms and systems for them. This challenge requires families and schools to join hands to equip pupils with knowledge and technology skills so that they have the understanding to exploit the positive aspects that support the studies and lives, as well as the ability to distinguish and identify the risks from technology and the internet that they face and deal with those problems.

4. Tasks set for the application of technology in education in ethnic minority areas in Vietnam

- The Government and the MOET need to continue to prioritize resources to invest in technological infrastructure, modern teaching equipment and human resources for educational institutions in ethnic minority areas to implement the preschool education program and the 2018 General Education Curriculum.
- Continue to review, amend, supplement and complete legal documents and directive and executive documents to create a legal framework and promptly urge, remove and settle issues arising from practice such as agreeing the regulations on data exploitation and sharing; concretize policies related to increasing investment in modern technological equipment and training human resources for education in ethnic minority areas.
- Complete a synchronous and practical technological infrastructure serving the teaching and learning, gradually transfer paper documents to electronic documents to facilitate the management work. At the same time, promote the development of digital learning materials (serving the teaching - learning, testing, evaluation, reference, scientific research), form a store of digital learning material, open learning materials for the whole sector, link with international countries, meet the demand of self-study, lifelong learning, narrow the gap between regions; continue to innovate teaching and learning methods on the basis of technology application, encourage and support the application of new educational models based on digital platforms.
- Keep on reviewing and planning the school and class network, invest in technology infrastructure, modern teaching equipment for all levels of education in ethnic minority areas to ensure reasonableness and suitability with reality. Prioritize investment in technology infrastructure for ethnic boarding schools, semi-boarding schools, schools with semi-boarding pupils, community learning centers in communes in ethnic minority and mountainous areas.
- Focus on building a team of teachers and educational managers in ethnic minority areas with sufficient quantity, ensuring structure and quality, meeting the requirements of educational innovation, focusing on raising awareness, skills and technological capacity for teachers and managers through training courses, cultivation, professional activities, forums... on exploiting and using educational software, supporting the design of electronic lectures, managing digital learning materials, electronic books, exploiting online learning platforms...
- Call for and attract investment and participation from social organizations, non-governmental organizations, businesses, pupils' parents, local communities... to support activities of construction, installation, repair of technology infrastructure, electronic equipment, training, improvement of technology applications in education or be able to build volunteer programs for teachers, lecturers, technology experts to support schools in ethnic minority areas.
- Focus on more specific and comprehensive scientific researches on ethnic minority areas to correctly assess the real situation, find out the causes and propose, recommend solutions to promote and develop efficiently technology applications in education; at the same time, overcome difficulties and limitations to contribute to improving the quality
of education in ethnic minority areas in Vietnam.

III. CONCLUSION

Although it has been proven to be very useful, the Industrial Revolution 4.0 brings both opportunities and challenges to education in general and education in ethnic minority areas in particular. In the current context, it is necessary to promptly grasp and efficiently utilize the opportunities brought by the Industrial Revolution 4.0 to improve productivity and educational efficiency as well as focus on research, transfer and strong application of

technological achievements in education. On that basis, propose solutions on policies, training, improvement, technological infrastructure... to overcome, limit and prevent difficulties and risks in the process of applying technology in education in general and education in ethnic minority areas in particular. With the results that have been achieved as well as with current efforts, we can be completely confident that education in ethnic minority areas is approaching more advanced and modern education, meeting the digital transformation in education in Vietnam. Thereby, improving the quality of human resources and creating momentum for education in ethnic minority areas to make a breakthrough, narrow the technology gap with favorable regions in Vietnam.

Within the scope of this study, only the domestic and international contexts on the impact of the Industrial Revolution 4.0 on education are studied - while the political, economic, cultural, social contexts... all have their own influences, creating their own opportunities and challenges for the application of technology in education. Therefore, future studies need to expand the scope to have a more comprehensive and general view of the application of technology in education in general and education in ethnic minority areas in particular.

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- *On contribution:* Vuong Thi Phuong Hanh: Writing, editing; Ha Van Quynh: General revision; Data collection and analysis: Vuong Quoc Anh., Pham Tuyet Nhung.
- *On conflict of interest***:** The authors declare to have no conflict of interest.

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