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THE PANDEMIC DIMENSION OF NEW EDUCATION AND POST-PANDEMIC TRENDS: TECHNOLOGY IN THE SERVICE OF EDUCATION?

Abstract: The COVID-19 pandemic, which swept across the globe, has left an indelible mark on various aspects of human life. Schools and educational institutions worldwide have had to adapt rapidly to the challenges posed by the pandemic. As a result, “new education” became a necessity, predominantly characterized by utilizing technology as an integral part of the learning process. This article examines the pandemic’s impact on education, focusing on its transformation. It also explores post-pandemic trends, particularly emphasizing how technology continues to reshape and serve the educational landscape.

Keywords: education, pandemic, new education, e-learning, technologies, GIS

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Introduction

The COVID-19 pandemic tremendously impacted all aspects of our lives, including education. Schools at all levels, including higher education institutions, worldwide had to adapt to a new reality in which remote learning became necessary. As society faced the challenges posed by the pandemic, education had to transform itself to keep up with the rapidly changing conditions. The COVID-19 pandemic forced educators and learners into a new reality, disrupting conventional in-person education norms. A shift towards "new education" became inevitable, wherein technology played a pivotal role in facilitating remote learning, connecting students and educators, and redesigning teaching methodologies. This article delves into the pandemic's influence on education and investigates emerging trends, highlighting the role of technology in this transformative journey. The analysis will be based on relevant literature and selected reports related to the titled issue concerning the directions for developing the education and learning process.

Discussion

Analysis of the state of the problems: Education Yesterday and Today: Changes and New Challenge. Education is an integral part of our lives and society. However, its face changes significantly over time. Comparing education from a few decades ago to today, one can observe numerous changes and transformations.

In the past, it was often said that all you needed for effective education was a chalkboard, chalk, and a good teacher. However, modern times show that these elements are no longer sufficient. It would not be easy to defend such a statement in today's world. In a changing reality, students' expectations and requirements are different.

Under the influence of new information and communication technologies, the world has greatly expanded and become closer. It has become a global village. Technological development has increased the quantity and significance of information delivered through the Internet and mobile phones. It has also created virtual spaces and worlds where Internet users interact. Further research and reports (such as the Norton Online Living Report) confirm that we bring real-world behaviors into the online environment. The emergence and development of a new concept of the Internet after 2001 (Web 2.0), where everyone can be both a creator and a consumer, has unleashed unprecedented communication and intellectual activity among young people.

These processes do not leave education untouched. The "new education" is not a product of the COVID-19 pandemic. We had already encountered the new learner and, in a way, a new educational world in which reaching the student required a completely different set of tools than in the 20th century. A new educational world has emerged, with its wealth of interactive, collaborative, and community tools – naturally used every day by young people, the "digital natives".

That's why, nowadays, chalk, a chalkboard, and a good teacher may prove insufficient to ensure the effectiveness of the education process. The new student in the

information society requires an entirely new approach to teaching, allowing them to transform the information reaching them into knowledge.

In 2006, Scottish scientists from the University of Abertay Dundee, in collaboration with the company DTI, presented a comparison between the old and new world of education. They published a report titled "Beyond e-Learning: Practical Insights From the USA", outlining the fundamental differences between these worlds. They considered criteria such as the auditorium, the learning process, and the design of the learning process (Bull et al., 2006).

Regarding the criterion of the audience, they noted that in the old world of education, it relied on a single source of knowledge. The education recipient was the educational team, consisting of the school or university community. Attention was paid to individual tasks and point thinking. In-depth knowledge was required, and teaching emphasized showing a clear result. On the other hand, in the "new education," multiple sources of knowledge are utilized. The recipients of education are various clients, partners, and public opinion. It goes beyond the school desks and university walls. Education is directed towards multitasking and global thinking. Broad knowledge is conveyed, although it does not have to be deep. Education presents various possible solutions. The offering is aimed at communities of learners rather than individual recipients (Keith, 2006).

As for the learning process, in the old education, the focus was on transmitting information. Knowledge was to be acquired throughout one's life through formal education. Emphasis was placed on the quality of acquired and processed knowledge (Polak, 2008).

In the "new education", attention is directed towards processes. This is a result of the belief that acquiring knowledge alone is ineffective. Knowledge becomes outdated, so education is an ongoing, lifelong process. It can be carried out through formal and informal means because it aims to enable individuals to function in society and the market. Therefore, education in this new perspective is focused on action, searching, and processing information. It emphasizes the quantity of processed knowledge (Keith, 2006).

Finally, when it comes to designing the education process, in the old education, trainers and lecturers were the masters of this process. The system was uniform and the same for everyone according to established, usually through legislation models. It had a comprehensive character and rich educational content (Polak, 2008).

In the "new education", various actors shape the educational process. The process is more personalized and scalable, considering the expectations and needs of learners, educators, and the socioeconomic environment. It has a fragmented and practical character. Education focuses on access to specific content or information and its utilization rather than information itself (Keith, 2006).

The mentioned contexts of "new education" and their differences from what can be considered classical education necessitate the development of new learning and teaching methods. Since these actions are to be focused on processes, lifelong learning,

and the acquisition and processing of information, technology will play a supporting role in facilitating the achievement of these goals (Polak, 2008).

Various entities participate in promoting and supporting the new education. Particularly noteworthy is the association EDUCAUSE, which helps higher education increase the impact of IT on education. It engages in expert, scientific, and educational activities and supports the educational process. The annual EDUCAUSE Horizon Report provides a diagnosis of the education system, describes trends in education, and sets directions for future actions. It also points out scenarios for the future. Since 2004, reports have been created concerning educational changes under the influence of new technologies. According to the report from 2019, modern education was supposed to look as follows:

Devices are intended to teach since they can communicate with humans. The Internet will be a ubiquitous communication and a place for knowledge processing. Teaching will be an ongoing process based on sharing knowledge regardless of age. Learning will involve processing a stream of information, focusing on practical, continuously updated knowledge rather than creating a resource for use throughout one's life. It will require accepting change and quickly assimilating new knowledge (2019 Horizon Report).

Education during a pandemic. Moments of global crisis have an enduring ability to drive technological advancements and the widespread implementation of technology in previously considered impossible ways. This situation is also evident in the case of the coronavirus pandemic. A positive outcome of crises is their recurring ability to transform something once deemed impossible into an accepted aspect of a new reality. The need for a rapid response to threats or unusual situations stimulates action.

Discussions about remote learning or education using technology in 2020 were not something new. They had been ongoing for over a decade. The pandemic merely accelerated certain processes and allowed for their verification. What phenomena could be observed during the pandemic? Primarily, remote learning was developed, increasing virtual learning opportunities and efforts to bridge the so-called digital divide.

In just a few days, educational institutions were forced to make significant strategic changes that had been in the works for years. China created a national cloud-based learning platform that provided learning materials to all junior high and high school students. They also incorporated public teaching programs into their national educational strategy through dedicated public television broadcasting materials for primary schools (Vinayak, 2020).

While these implementations are not seen as a substitute for the one-to-one physical classroom learning experience, the Chinese government invested significant resources in the short-term profitability of these supplementary programs. In the first week, 169 lessons involving 12 students each were introduced on the e-learning platform. Major Chinese telecommunications companies, such as China Mobile, China Unicom, and China Telecom, joined tech giants like Baidu, Alibaba, and Huawei to

strengthen the digital education network with 7,000 dedicated servers and 90 terabytes of bandwidth (Frankfurt, 2020).

What we have witnessed in a short period since the onset of the pandemic is the virus's impact on driving widespread innovations in the higher education sector. For example, Common Sense Media responded to the demand by establishing its openly accessible school: a free online resource supported by over 25 organizations. Wide Open School provides educational experiences encompassing all major subjects for teachers and students, connecting families with affordable internet access programs and technical assistance (Frankfurt, 2020).

The attitude and motivation inherently linked to these and other experiences can broadly impact the world of higher education. Just like the Chinese cloud-based learning platform, creating a deep well of educational materials that are freely available to students provides another knowledge base for their future success. It enhances the viability of the online learning experience.

Traditional classroom learning is unlikely to disappear entirely. Still, with the advent of 5G technology, there is an even greater opportunity for enhanced virtual solutions to complement the in-class experience. The negative consequences of this divide intensify during times of crisis, leading to a lack of information, education, and opportunities for those offline. Now, more than ever, we must collectively strive for more accessible technology and bypass physical limitations in favor of virtual solutions (Frankfurt, 2020).

Online education requires the right tools and levelling the playing field for all students regarding access to technology. To address this, Calbright launched a lending library with over 500 Chromebooks and WiFi hotspots for students who lack economic stability or have been negatively affected by the new coronavirus. The readiness of educational institutions to provide tools and reduce the digital divide demonstrates their understanding that online teaching is about much more than just technology. It's about offering support to those who teach and those who learn. This supportive mindset is crucial for our short-term and long-term return to "normalcy" (Toczauer, 2023).

Therefore, the pandemic has led to the development of hybrid and remote learning and the expansion of virtual learning opportunities. Tools and applications for remote education have evolved. At the same time, the pandemic has highlighted issues related to digital exclusion and the need to create policies and solutions to address them. Embracing this new way of learning has required a change in the mindset of teachers, students, and learners, as well as the broader education of digital skills in society.

Directions of "New Education" in the Post-Pandemic Time. The COVID-19 pandemic has profoundly impacted education systems worldwide, forcing educators, policymakers, and institutions to adapt and innovate. As we move into the post-pandemic era, several directions or trends are emerging in education. These directions aim to address the challenges posed by the pandemic and build a more resilient and effective education system. Here are some key directions for "New Education" in the post-pandemic time. They use technology in the service of education.

Rapid Adoption of Online Learning. The most apparent manifestation of the pandemic's influence on education was the widespread adoption of online learning. Schools and institutions worldwide quickly transitioned to online platforms, necessitating a paradigm shift in pedagogical approaches (UNESCO, 2020).

The primary motivation behind the rapid adoption of online learning was to ensure the continuity of education. Closing schools and universities indefinitely posed a serious risk of disrupting students' academic progress. Online learning emerged as the most viable solution to bridge this educational gap and remotely provide students access to instructional content. Online learning offers flexibility and accessibility that traditional classrooms cannot match. Students can learn at their own pace, from anywhere with an internet connection. This flexibility has particularly benefited students previously facing geographical or logistical educational barriers (Nguyen, 2015; Zhao et al., 2005).

Advancements in technology played a crucial role in facilitating the rapid transition to online learning. Video conferencing platforms, Learning Management Systems (LMS), and various educational apps allowed educators to conduct virtual classes and deliver course materials seamlessly (Aljawarneh et. al., 2010).

The swift embrace of online learning during the pandemic has far-reaching educational implications. Online learning blurred the geographical boundaries of education. Students gained access to courses and resources from institutions worldwide, enabling them to choose the best educational experiences that suit their needs. Both educators and students were compelled to enhance their digital literacy skills. Proficiency in navigating digital tools and platforms became an asset, and these skills will likely remain relevant in the post-pandemic education landscape.

Online learning platforms can gather data on students' progress and engagement. This data can be used to tailor instruction to individual needs, providing a more personalized learning experience.

While the pandemic necessitated the rapid adoption of online learning, its impact will continue to shape the future of education. The experiences gained during this transformative period have opened new avenues for integrating technology into education.

The Rise of Hybrid Learning. Combining traditional in-person classes with online instruction, hybrid learning emerged as a pragmatic solution. It allows for flexibility in teaching methods and gives students access to educational materials regardless of their location. Hybrid learning (blended learning) represents a dynamic educational approach integrating face-to-face and online instruction. This method aims to harness the strengths of both traditional classroom learning and digital platforms, offering students a comprehensive and adaptable educational experience. One of the key benefits of hybrid learning is its flexibility. Students can access course materials and engage in learning activities at their own pace and convenience, regardless of physical location. This flexibility caters to diverse learning styles and individual schedules, making education more accessible (Raes, 2022).

Hybrid learning models incorporate technology that can track students' progress and engagement. This data can be used to tailor instruction to individual needs, providing a more personalized and effective learning experience. Educators can identify areas where students need additional support and adjust their teaching strategies accordingly. Hybrid learning encourages collaboration and interaction among students and educators. Online discussion forums, virtual group projects, and collaborative online tools foster teamwork and critical thinking skills, promoting a more engaging learning environment.

The rise of hybrid learning has profound implications for education. Educators have had to adapt their teaching methods to blend online and in-person instruction effectively. This transformation has led to the development of innovative pedagogical strategies that harness the strengths of both modalities. Both students and educators have been compelled to enhance their digital literacy skills to navigate the digital tools and platforms integral to hybrid learning. These skills have become essential in the modern educational landscape. Institutions have recognized the importance of ensuring equitable access to technology and Internet resources for all students. Efforts have been made to bridge the digital divide, enabling underserved populations to participate fully in hybrid learning experiences. Many educational institutions consider integrating hybrid learning into their curricula, recognizing its ability to provide flexibility and personalized learning experiences (Miao & Li, 2019).

Blended learning encompasses diverse modalities, allowing educators to create a customized learning experience. It combines traditional classroom interactions, synchronous online sessions, asynchronous digital resources, and interactive activities. This diversity enables educators to cater to various learning styles and adapt to individual needs (Picciano, 2009; Olivers et al., 2018).

Blended learning is not a temporary response but a long-term commitment to enhancing education. As it continues to evolve, several trends will likely shape its future. Advancements in educational technology will drive the evolution of blended learning. Augmented and virtual reality, artificial intelligence, and advanced analytics will provide new opportunities for enriching the learning experience.

Blended learning can transcend geographical boundaries, allowing institutions to reach a broader audience. Institutions will increasingly offer courses and programs that cater to a global student base, promoting diversity and inclusivity in education.

Augmented Technologies. Augmented Technologies, including Virtual Reality (VR) and Augmented Reality (AR), have emerged as transformative tools in hybrid learning. These technologies bridge the gap between traditional classroom experiences and the digital world, offering students immersive and interactive educational opportunities.

VR technology creates computer-generated environments that allow students to immerse themselves in simulated educational scenarios. This immersive experience can transport learners to historical landmarks, far-off galaxies, or inside the human body, providing an unparalleled understanding of complex subjects. For instance, VR can recreate historical events, allowing students to witness history firsthand or simulate

science experiments, fostering a deeper grasp of scientific principles (Sheela et al., 2023).

AR technology overlays digital content onto the real world, enhancing the physical environment with digital elements. This technology is particularly promising in hybrid learning, as it seamlessly blends the physical and digital realms. Students can use AR apps on their devices to access additional information, animations, or interactive elements during traditional lessons or while exploring physical spaces (Sheela et al., 2023).

Augmented technologies captivate students' attention and stimulate curiosity. The immersive and interactive nature of VR and AR experiences fosters active participation in the learning process. Integrating augmented technologies, specifically VR and AR, into the hybrid learning environment offers exciting opportunities for educators and students. These technologies provide immersive and interactive experiences that enhance engagement, comprehension, and collaboration. As educational institutions continue to embrace hybrid learning models, augmented technologies will play an increasingly crucial role in shaping the future of education.

Customized Learning Experiences. Technology, including machine learning algorithms, enables the customization of education to cater to individual student abilities and needs. It allows educators to adapt materials and learning pace accordingly.

Customized learning, also known as personalized learning, is an instructional approach that tailors the learning journey to meet individual students' unique needs, preferences, and abilities. It shifts the focus from a one-size-fits-all model of education to one that adapts to the diverse requirements of learners. At the core of customized learning experiences lies technology and data analytics. Educational technology and software applications are harnessed to collect and analyze data on students' learning patterns, progress, and areas of strength and weakness. This data-driven approach allows educators to create individualized learning paths (NC State University).

The adoption of customized learning experiences has several significant implications for education. When students have control over their learning experiences, they are more engaged and motivated to learn. Customization increases student ownership of their education.

Customized learning experiences represent a significant shift in educational paradigms. By focusing on individual needs and preferences, these experiences enhance engagement, improve learning outcomes, and promote inclusivity. As technology and data analytics continue to evolve, customized learning will play an increasingly crucial role in shaping the future of education, ensuring that every learner can succeed.

Geographic Information Systems (GIS) in Education. Geographic Information Systems (GIS) have gained prominence in geography education. GIS tools allow students to interactively explore spatial data, create maps, and perform spatial analysis, enhancing geographic understanding (Bernhäuserová et al., 2022).

The integration of GIS into geographic education has yielded several transformative benefits. GIS enables students to engage in hands-on learning experiences. They can explore real-world geographic phenomena, conduct spatial analyses, and create maps, fostering a deeper connection with the subject matter. GIS transcends traditional disciplinary boundaries, making it a valuable tool for students studying geography, environmental science, urban planning, and many other fields. It promotes interdisciplinary exploration of complex spatial issues.

Geographic education enhanced by GIS promotes spatial thinking, a critical skill in understanding and addressing global challenges such as climate change, urbanization, and natural disasters. It encourages students to think critically about spatial relationships.

The future of geographic education is closely intertwined with GIS. Advancements in GIS technology will continue to provide educators and students with enhanced digital tools, facilitating more sophisticated spatial analyses and data visualization. GIS promotes collaboration on a global scale. Students can connect with peers and experts worldwide, working together to address pressing global issues. GIS will play a crucial role in citizen science initiatives, allowing students and the general public to contribute valuable geographic data to scientific research and environmental conservation (McCloughlin, 2015).

Geographic Information Systems have revolutionized geographic education by providing powerful tools for exploration, analysis, and spatial understanding. As technology evolves, GIS will remain a cornerstone of geographic education, fostering spatial thinking, interdisciplinary exploration, and career readiness for students worldwide.

Conclusions

The coronavirus pandemic has changed how millions of people worldwide approach education. "New education" solutions can bring much-needed innovation. Considering the digital divide, new changes in the approach to education may widen disparities in equality.

Within a few weeks, the coronavirus (COVID-19) has altered how students are educated worldwide. These changes provide insight into how education may change for better – and worse – in the longer term.

At the beginning of the PANDEMIC, on March 13, the OECD estimated that over 421 million children were affected by school closures announced or implemented in 39 countries. Furthermore, another 22 countries declared partial "local" closures.

These decisions regarding risk control have led millions of students to temporary "home learning", especially in some countries hardest hit by the crisis, such as China, South Korea, Italy, and Iran. These changes have certainly caused some inconveniences but have also resulted in new examples of educational innovation. Although it is too early to assess how responses to COVID-19 will impact education systems worldwide, signs suggest that it may have a lasting influence on educational innovation and

digitization trajectory. Below, we track three trends that may indicate future transformations.

Firstly, the demands on education and learning in the face of change can contribute to surprising innovations. The slow pace of change in academic institutions worldwide is regrettable, with centuries-old lecture-based teaching approaches, entrenched institutional biases, and outdated classrooms. However, COVID-19 has prompted educational institutions worldwide to seek innovative solutions relatively quickly.

Secondly, the importance of public-private partnerships in education may increase. During the pandemic, the formation of consortia and coalitions within the education sector to develop guidelines for crisis management, including the use of digital platforms, could be observed.

Thirdly, the current situation may deepen digital inequalities and lead to exclusion.

If access costs do not decrease and access quality does not improve in all countries, the education quality gap and socioeconomic equality will continue to deepen. The digital divide may become more extreme if access to education is dictated by access to the latest technologies.

The COVID-19 pandemic catalyzed a transformation in education, ushering in the era of “new education” characterized by increased reliance on technology. Blended learning, personalized instruction, and the proliferation of e-learning and online courses are among the post-pandemic trends shaping the future of education. GIS tools have revolutionized geographic education, enabling interactive spatial data exploration. Integrating technology in education offers flexibility, accessibility, and personalized learning experiences, heralding a promising future for the field.

The COVID-19 pandemic has complicated education and accelerated educational technology development, including GIS. Blended learning, personalized learning, e-learning, and the use of GIS are just some of the post-pandemic trends shaping the future of education. GIS in geographic education allows students to interactively explore spatial data, greatly enhancing their understanding of geographic concepts. Thanks to technology, education has become more flexible and tailored to individual student needs, opening up new opportunities in the learning process. The question remains whether society is prepared for and needs this direction of educational development.

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