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Future of Digital Natives

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ABSTRACT

We live in the digital age where everything is touched and connected by technology. The invisibility of digital technology has produced a distinctively new generation defined by digital media: the digital natives. Digital natives are people who have grown up using technology from early childhood. They are the new citizens of the digital world. It is difficult to predict the exact impact of the technologies on digital natives. However, emerging technologies are poised to transform digital natives shortly.

KEYWORDS: *digital natives, digital immigrants, characteristics, future*

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INTRODUCTION

We live in a world with an abundance of technologies and the technologies are developing and improving rapidly. Technologies are transforming our lifestyles, social interactions, and workplaces. Technologies can be used to ensure equity, fairness, and realize a better quality of life. Nearly everyone in the developed nations possesses multiple electronic gadgets (cell phones, tablets, personal computers, laptops, digital notebooks, etc.). The phenomenon of digital technologies transcends all cultural, racial, religious, and age boundaries [1].

Technology is a tool that usually helps improve efficiency and effectiveness.

Technologies are evolving at a rapid pace all over the world. They have enabled better quality research, treatment, and access to healthcare. Technology-focused companies such as Google, Amazon, and Apple are beginning to make a significant impact on the existing market. The ongoing COVID-19 pandemic has further propelled the importance of emerging technologies in disease management and prevention [2].

We live in an always-connected, digital age. The Digital revolution is changing the world as we know it. It is transforming what we do, how we do it, and who does it. Digitalization will literally save lives. In the fast-paced digital age, it is hard to find moments to reflect on the events of the past, the challenges of the present, and the hopes for the future. Although we cannot foresee exactly what the future of technology will be in the next ten or twenty years, there are a handful of advances in technology that we can expect. The future of technology will likely be driven by digital transformation, enabled by artificial intelligence, and the integration of newly emerging technologies. The digital natives are the best placed to lead the digital transformation. This generation can change the world if we let them.

WHO ARE DIGITAL NATIVES AND DIGITAL IMMIGRANTS?

Technology fundamentally changes how people communicate, educate, connect, and do business. Young adults have grown up with technology at their fingertips. Due to new technologies in the lives of youths, they live differently from their predecessors.

They have been labeled digital natives. This generation is the future. The term "digital native" has become popular in recent years. It was coined and popularized by education consultant Marc Prensky in 2001 [3]. Digital natives are generally born after 1980. They are those who were raised in a digital, media-saturated world. They have been integrated into the lives of digital natives since early childhood. The natives grew up with the Internet and cannot live without their smart devices. They are naturally and intuitively digital. Digital immigrants can be said to have acquired proficiency with the Internet later in life. They are individuals who were born before the spread of digital technology [4]. Prensky argued that a great digital divide has developed between the young who have grown up with technology and older people who have become acquainted with technology later in life. A simple way to differentiate digital natives and digital immigrants is where they go to get news. Digital natives are likely to choose social media, while digital immigrants may consult traditional media such as newspapers and TV. Digital immigrants are generally the parents, teachers, and managers. Figure 1 shows some examples of digital natives [5].

CHARACTERISTICS OF DIGITAL NATIVES

Many characteristics make digital natives interesting to study: their racial diversity, their status as the most educated generation to date, their low marriage rates, their tech addiction, just to name a few. Digital natives are constantly multitasking, having multiple screens open and programs running simultaneously. As shown in Figure 2, when we add up all the online activities in the "average" day of a digital native it results in 27 hours! [6]. They often have multiple screens open and several programs running simultaneously. Their tendency to multitask reduces their task efficiency. Here are some other characteristics of digital natives that affect their behavior and perception in the digital world.

1. They have an inherent understanding of digital technologies.
2. Their mother tongue is the digital language of computers, video games, and the Internet.
3. They regard technology as an extension of their bodies.
4. They seem to be constantly connected to the Internet via social media and mobile devices.
5. They transact most of their business online.
6. They use their phones continuously during the day.
7. They consider speed to be the most important characteristic of digital devices.
8. They read less than digital immigrants.
9. They are used to receiving information fast.
10. They blame the technology, and not themselves when something goes wrong.
11. They need convenience and ease when scheduling appointments.
12. They have an active, selective attitude when making decisions.
13. They are marrying late and at low rates.
14. They are also impatient, desiring fast career growth without the work ethics of previous generations.
15. They often expect things to happen quickly, being accustomed to the immediate response of the Internet, texting, and smartphone apps.
16. They balance work and life during the day and through several locations.
17. They are likely to prefer flexible hours and working at home.
18. They do not stay long in their jobs.
19. They are egalitarian, flexible, and task-switching with just-in-time skills.
20. They assemble knowledge from various sources.

FUTURE OF DIGITAL NATIVES

The entire life cycle of digital natives will become more digital. The future of work requires architecture, and digital natives are its architects. It will also require more collaboration, communication, and digital workplace tools. The future workforce will be dominated by digital natives with the ability to pursue both purpose and profit. Digital natives will lead the workforce into a unified team that can seamlessly collaborate and innovates together. As the digital transformation of our workplaces continues, digital natives will be important players in the future of business. The natural inclinations make digital natives to be best suited to lead and drive modernization projects.

All human actions are based on anticipated futures. Although we cannot predict the future, we can use our current knowledge to imagine futures. The better we understand the present and the history that has created it, the more we understand the possibilities of the future. Two decades ago, no one had heard about Google, Facebook, YouTube, or Wikipedia. Today they are the most used digital tools on the planet. Whether rosy or rocky, the future is coming quickly, and digital technologies and digital natives will certainly be a part of it. The future education, the future business, the future workforce, and the future technology will allow digital natives to find

information easily without compromising safety and security. They must favor digital natives so that they can be connected from anywhere, anytime. Productivity applications will become popular and help digital natives manage their days [7].

FUTURE OF TECHNOLOGY

Technology plays a key role in the lives of digital natives. They depend heavily on their mobile devices and Internet 24/7. The future of technology is shaping up with advances in technologies, such as cloud computing, artificial intelligence, robotics, 3D printing, and nanotechnology. Future technologies include the following [8].

- **Artificial Intelligence:** Artificial Intelligence (AI) deals with intelligent machines, which can perform tasks heretofore only performed by human beings. It is mainly concerned with applying computers to tasks that require knowledge, perception, reasoning, understanding, and cognitive abilities. Artificial intelligence, with the capacity to make computers learn from experience, is playing a predominant role in many industries. AI algorithms, such as machine learning and deep learning, are most commonly used to make intelligent predictions. AI focuses on how computers learn from data and mimic human thought processes. The major components of AI include expert systems, fuzzy logic, artificial neural networks (ANNs), machine learning, deep learning, natural language processing, computer vision, and robotics. AI has also received increased attention in recent years due to its applications in industrial real-time systems and investments in AI have grown over the years. Although AI is a branch of computer science, there is hardly any field that is unaffected by this technology. Common areas of applications include agriculture, business, law enforcement, oil and gas, banking and finance, education, transportation, healthcare, automobiles, entertainment, manufacturing, speech and text recognition, facial analysis, and telecommunications. AI is redefining the job descriptions of all sectors of professions. Today industrial leaders such as Google, Microsoft, Procter & Gamble, and IBM have invested heavily in AI [9]. There is little doubt that AI is inexorably linked to the future of education and the future of business. We look towards a future when AI tools will support teachers in meeting the needs of their students. AI will continue to shape the business world for years to come in ways we can hardly imagine. AI has the potential to dramatically remake the economy [10]. Digital natives are more likely to interact with AI if they grow up in a household that embraced AI assistants such as Cortana from Microsoft, Siri from Apple, Alexa from Amazon, etc.
- **Robotics:** Robotics is part of AI. It is one of the most exciting and fastest-growing fields in technology. A robot is a mechanical intelligent device that can perform human tasks on its own or with guidance. It can sense, act, think, or process information. A robot functions as an intelligent machine, meaning that, it can be programmed to take actions or make choices based on input from sensors. It involves using electronics, computer science, mechatronics, and bioengineering. While early robots were simple mechanical automated machines, modern robots employ microprocessors and computer technology. They can be programmed and "taught" to perform certain tasks. They are taking on more "human" traits such as sensing, dexterity, memory, and trainability. Robots typically use sensor data to make decisions. Robotics has benefited a wide range of industries, from car manufacturing to healthcare and space exploration. Today, robots perform vital functions in homes, industries, outer space, hospitals, and military installations. In jobs with repetitive and monotonous functions, they might even completely replace humans. Robotics and autonomous systems are regarded as the fourth industrial revolution. Robots, as well as related sensors and software, are becoming cheaper and more capable [11]. Figure 3 shows a robot performing surgery [12].
- **Internet of Things:** The Internet is regarded by many as the greatest technological disruption of all time. The Internet is disrupting the notion of who and what can be monitored and managed—and from where, and for how long. The Internet of things (IoT) is a link between objects in the real world with the virtual world, thereby enabling anytime, anywhere connectivity for anything. The goal of IoT is to integrate and automate everything from home appliances to plants on factory floors. Most of the devices we use today support communication technology and can interact among themselves through the Internet. IoT is the convergence of the Internet with RFID, sensors, and smart objects. IoT has potential for societal as well as economic impact. The main advantage of the IoT concept is the high impact it will have on various aspects of the everyday life of potential users such as digital natives. The Internet of things is applied in

healthcare, automotive industries, smart power grid, manufacturing, transportation, agriculture, logistics, pharmaceutics, surveillance, etc. [13].

- **Big Data:** The concept of big data refers to the massive amount of data generated through the digitization of all sorts of information, including health records. Big data is often described with the five "Vs": volume, velocity, variety, veracity, and value. On this basis, small data can be regarded as having low volume, low velocity, low variety, low veracity, and low value. Some regard big data as data over one petabyte in volume. Big data has rapidly made its way into a wide range of industries, and it has changed the way we manage and analyze data. It is a major challenge for industries such as defense, transportation, agriculture, and banking. Big data (BD) is essentially about gathering information from disparate sources and analyzing it to reveal trends that can directly improve patients' well-being. It is generating a lot of attention in every industry. Big data is now a booming industry, which digital natives cannot ignore [14].
- **3D-printing:** Three-dimensional printing (3DP) (also known as additive manufacturing) is the means of producing three-dimensional solid objects from a digital model. It is a manufacturing procedure in which an object is fabricated by depositing materials—such as plastic, metal, ceramics, powders, liquids, or even living cells—using additive processes in which successive layers of material are assembled on top of one another to produce the desired 3D object. It has been used in manufacturing, automotive, electronics, aviation, aerospace, aeronautics, engineering, architecture, pharmaceutics, consumer products, education, entertainment, medicine, space missions, chemical industry, defense, consumer products, jewelry industries, military, libraries, food industry, dental, human medicine, veterinary medicine, maritime industry, jewelry industry, etc. It has been regarded as one of the pillars of the third industrial revolution. It has emerged as a disruptive technology that is beginning to infiltrate homes and enter the mainstream. It has created a new generation of at-home and do-it-yourself manufacturers and children are starting to adopt it. The technology will significantly affect digital natives [15].
- **Nanotechnology:** This is a relatively new interdisciplinary field those studies materials at the nanoscale (about 1 to 100 nanometers). Nanotechnology enables us to make to manipulate materials on the atomic or molecular scale to produce objects which are no more than a few nanometers in diameter. The processes used to make and manipulate such materials are known as nanotechnology, the materials or objects themselves are called nanomaterials, and the study and discovery of these materials are known as nanoscience. Nanotechnology is an emerging innovation in science and engineering that will transform many sectors. It improves existing industrial processes, materials, and applications by scaling them down to the nanoscale ultimately to fully exploit the unique properties exhibited at the nanoscale. Nanotechnology is applied in almost every field such as surface coatings, sensors, electronic components, membranes, medicine, environmental remediation, water filtration, nanoelectronics, nanomedicine, food and agriculture, cosmetics, energy, space and aeronautics, automotive industries, sports equipment, aerospace, energy, information technology, national defense, transportation, and the list goes on. The emerging and commercial applications of nanotechnology are leading to a technological revolution, which will revolutionize the way our society manufactures goods, generates energy, and treats diseases. It is becoming a larger presence in everyday life and is regarded by governments and economic actors as a key area for development that digital natives have to deal with [16].
- **Cloud Computing:** Cloud computing is an emerging computing paradigm for delivering computing services (such as servers, storage, databases, networking, software, analytics, and more) over the "the cloud" or Internet with pay-as-you-go pricing. It is a means of pooling and sharing hardware and software resources on a massive scale. Users and businesses can access applications from anywhere in the world at any time. The main objective of cloud computing is to make better use of distributed resources and solve large-scale computation problems. Cloud computing has many benefits like flexibility, cost and energy savings, resource sharing, and fast deployment. The cloud provides unprecedented scaling, data integration, and access advantages. Cloud computing is used in education, large enterprises, small and medium businesses, manufacturing, industrial automation, life sciences, pharmacy, e-government, and medicine. Global collaboration depends on cloud computing. It is hard to predict the impact of cloud computing on our society, especially the digital natives [17].

- **Cybersecurity:** We are all connected to the Internet one way or the other. The Internet is used for everything from storing a company's confidential information to social networking. Because of its fast, cheap, and anonymous character, the Internet has become a place for various attacks and criminal activities. Also, as a result of the increasing use of personal data, cybersecurity has emerged to be important more than ever before. By nature, cyberspace or the Internet is difficult to secure. Intruders exploit the vulnerabilities to steal information and money and perpetrate crimes. Cybercriminals will continue to discover and exploit new attacks and manage to stay one step ahead of cybersecurity. The crimes include child pornography, banking and financial fraud, and intellectual property violations. They may also include accessing government and defense confidential information, tampering with commercially sensitive data, and targeting supply chains. Cybersecurity is the process of protecting computer networks from cyberattacks or unintended unauthorized access. It involves reducing the risk of cyberattacks. It involves the collection of tools, policies, guidelines, risk management approaches, and best practices that can be used to protect the cyber environment and mitigate cyber-attacks. The game-changer for cybersecurity could be next-generation technologies along with the digital natives [18].
- **Smart Technologies:** Recent advances in the field of technology have led to the emergence of innovative solutions known as smart technologies. A technology is considered smart if it performs a task that an intelligent person can do. Smart technologies refer to the use of digital and communications technologies. They have given us new, powerful tools to work. Smart technologies are next-generation technologies having a great future. The application of such technologies can transform conventional cities into smart cities, conventional homes into smart homes, conventional farming into smart farming, etc. Today, we are surrounded by many things that are called smart. They include a growing array of technologies such as smartphones, smart homes, smart grids, smart cities, smart energy, smart transportation, etc. Digital natives will be greatly impacted by smart technologies [19].

Digital natives will be utilizing digital technologies in their daily life like the rest of us breathe oxygen. They will have to deal with these emerging technologies and their various applications. These technologies have the potential to make an enormous impact on digital natives. Their applications are poised to grow rapidly shortly. These are the key enablers of technological advances in education, healthcare, business, and the workplace. They will become the new norm for businesses looking to increase productivity.

CONCLUSION

Technology is a key part of the personal and social lives of digital natives. The broader industry digitization shifts will have a big impact still on digital natives. Digital solutions can enable evidence-based outcomes and drive value-based spending. Digital natives are citizens of the digital world. They will be empowered through personalized, decentralized care, with more power in the patient's hands. Looking toward the future, one can imagine a fundamental change in the character of digital natives. The future of healthcare will be shaped by forward-looking digital companies and digital natives, and their ability to develop connections with the people and communities they serve. Technology will continue to transform and revolutionize every industry. The future is digital, and the future of digital technology lies with digital natives. More information about digital natives and their future can be found in the books in [20-26].

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Figure 1 Examples of digital natives [5].

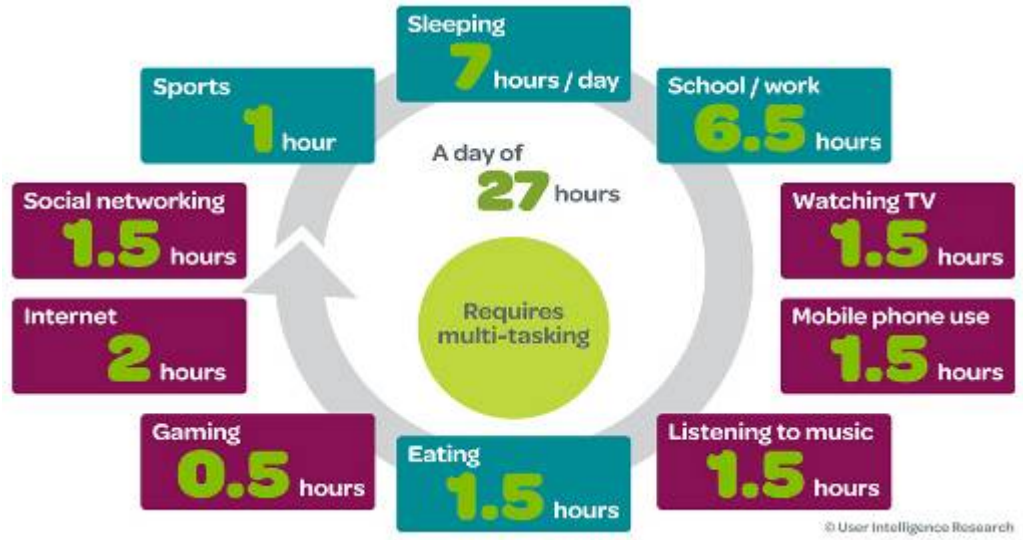

Figure 2 Digital natives multi nn``task all day [6].

Figure 3 Using the da Vinci robot for surgery [12]