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Impact of Digital Technologies on World

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Abstract

Digital technology refers to electronic tools or automatic systems designed to store and process data. Digital technology provides us to work online, e-shopping, apps, and social media. Digital information can be stored on different types of media including electronic storage devices like digital files and memory cards. Some examples of digital information may include email, web pages, pictures, music, videos, documents, and other such data. Digital information refers to video, images, text, and sound. Digital Information Technology is a broad branch of engineering, which concentrates on converting data into information and then vice versa. In addition, digital information technology is used to transfer data and information in the form of images, texts, sounds, and videos.This paper attempts to demonstrate the significance of digital information technology in 21st century.

Keywords: digital technology, digital information, digital files, digital images and videos

Introduction

Digital information refers to representations of numbers, text, sound, and images as a combination of two fundamental logic symbols: 1 and 0. These symbols are also called binary symbols, binary digits, or bits. Digital devices process information in the form of ones and zeros; in other words, they speak a binary language Information Technology. Digital Domain implies that the original data (image, sound, video, etc.) have been converted into a digital format and are manipulated inside the computer's memory.

Digital Devices: Digital devices process information in the form of ones and zeros; in other words, they speak a binary language. In order to process digital information, these devices contain basic switches that switch on and off to represent bits. Digital devices are built by combining millions or even billions of these switches. By connecting the switches each other in a particular way and appropriately turning them on and off, the devices can manipulate digital information. An electronic digital device such as a computer contains millions of these switches, and processes digital information such as audio files, text tiles, and video files by electronically turning the switches on or off. Today, the size and capability of digital devices is governed by the number of transistors that can be incorporated on the thin semiconductor layer of an IC made of silicon.

Digital Signals: Digital signals are commonly used in communication systems where digital transmission can transfer data over point-to-point or point-to-multi point transmission channels, such as copper wires, optical fibers, wireless communication media, storage media, or computer buses. The transferable data is represented as an electromagnetic signal, such as a microwave, radio wave, electrical voltage, or infrared signal.Digital signals can be easily stored on any magnetic media or optical media using semiconductor chips. Digital signals can be transmitted over long distances. Digital signals can convey information with less noise, distortion, and interference.

Digital signal processor: Digital signal processor is a special type of microprocessor which is fabricated on metal oxide semiconductor integrated circuits. DSPs are extensively used in different applications like digital image processing, telecommunications, audio signal processing, speech recognition systems, sonar, radar, etc, and also used in consumer electronics like mobile phones, HDTV (high-definition television) products, disk drives, etc. DSP is used primarily in areas of audio signal, speech processing, RADAR, seismology, audio, SONAR, voice recognition, and some financial signals.

Digital Technology

American engineers began developing digital technology in the mid-twentieth century. Their techniques were based on mathematical concepts suggested by the seventeenth-century. German Mathematician, Gottfried Wilhelm Leibniz, who proposed a binary computing system. His innovation inspired such numerical codes as American Standard Code for Information Interchange (ASCII) that described objects with digits. Digital technology encompasses digital devices, systems, and resources that help to create, store, and manage data. It is a crucial part of modern business to improve the workflow and customer experience. Digital technology has enabled businesses to store huge amounts of data, and access and retrieve it whenever needed. The social media platform is an example of digital technology. Artificial intelligence (AI) is also digital technology. Digital technology is a base two process. Digitized information is recorded in binary code of combinations of the digits 0 and 1, also called bits, which represent words and images. Digital technology enables immense amounts of information to be compressed on small storage devices that can be easily preserved and transported. Digitization also quickens data transmission speeds. Digital technology has transformed how people communicate, learn, and work.

Telecommunications has relied on digital methods to transmit messages. In the early 1980s, enhanced fiber optics enabled the development of digital communication networks. Digital technology replaced analog signals for many telecommunication forms, particularly cellular telephone and cable systems. In the early 2000s, digital computers ranging from laptops to Internet networks came in many sizes and performed various tasks. Supercomputers performed complex mathematical calculations analyzing vast amounts of data. The Digital Data Broadcast System (DDBS) guided air-traffic control. Digital radiography converted analog signals of x-rays to create digital images. Digital information was stored on plastic disks with pitted patterns of 1s and 0s that lasers translated. By the early 2000s, digital cameras had transformed photography by recording color and light intensities with pixels. Also, digital compression of images and video was achieved by Joint Photographic Experts Group (JPEG) and the Moving Picture Experts Group (MPEG) codes. Animation had often been digitized with some films and cartoons being created entirely with computers.

Digital technology and Industry

Digital technological innovations creates a cyber-physical environment that results in completely rethinking the way assets and industrial processes work. The industry of the future will be an industry in the era of the digital revolution, capable of producing more smartly, more efficiently, more quickly, more safely, and more cleanly. Pascal Brier identifies four major impacts of the digital revolution on the industrial world.

1. Improved performance and flexibility: Being interconnected, the means of production will be able to not only self-regulate by reacting immediately to any problems but also to self-monitor with preventive maintenance made possible by multiple sensors. This will mean a significant decrease in random events and delays. And in addition, by having full control over their production system, manufacturers will be able to produce on demand.
2. Increased productivity: Collaborative robots (cobots) will significantly increase the productivity of operators and improve their safety and well-being.
3. A massive reorganization of the supply chain: Traditional production models sometimes lead to having to relocate certain factories in order to make them profitable by producing a lot at low cost. Thanks to 3D printing, they will be able to maintain and repair all industrial goods locally. Which means that in the future, if we need a part for our car, it can be produced directly in the garage closest to us, rather than being ordered from the factory.
4. Mass customization: we are entering the era of mass customization, where production responds to demand, where virtual reality makes it possible to push the limits of the imagination ever further. This opens great possibilities for agile businesses able to make it a real business lever. Obviously, digital transformation is not a straightforward exercise. We need to be able to identify the right technologies, ensure the commitment of both operators and supervisors, and rely on the support of experts. And, like all revolutions, this one has begun silently: we are in a transition phase, which is likely to last another decade.

Digital Technology and Education

technology in education has never been the priority for the government or indeed for many schools, it is now at the forefront as a way to enable learning to continue in order to avoid the already growing gap of inequality and disparity between our pupils (Foster and Staton, 2020). Literature from the World Economic Forum (2020) suggests that COVID-19 has taken on the form of a catalyst for educational institutions to search for innovative solutions to age-old problems. In some cases, teachers and students have had to embrace technology for the very first time. The use of technology gives education a new meaning, allowing for online lessons where teachers and students can collaborate and discuss in real time. Amongst all this change, my principal concern lies with the teachers and the impact teaching online has made to their current pedagogic practices, and the effects on the students – in keeping them engaged and continuously motivated to learn.

Online pedagogical strategies: According to a 2019 EduCause survey, only nine per cent of instructors prefer to teach in a completely online environment (Galanek and Gierdowski, 2019). This suggests that 91 per cent of the rest of teachers prefer face-to-face classroom teaching. This should come as no surprise, as chances are, there is less excitement and buzz at the end of a lively online discussion than could possibly take place in the classroom. But good teaching will yield good conversations and these can also take place online, provided teachers have a good understanding of the types of pedagogical practices that will work most effectively.Flaherty (2020) suggests that there is a delicate balance to be achieved between delivering live teacher-student lessons vs. independent flipped learning instruction, sometimes followed by assessment. It is also important to recognize appropriate online pedagogical strategies that resonate with the age of the child. Good teaching requires teachers to be in the classroom with their students, and this is particularly relevant with younger children. When primary school teachers teach, they engage with the children in a playful and highly communicative manner, explaining, guiding, asking, illustrating and answering questions. This can allow for the lesson to flow smoothly and will help keep younger students engaged. Young children learn through play and when they feel safe, secure and connected, they have a greater chance of learning (Lego Foundation, 2017). Asynchronous learning, or the concept of flipped learning methodology is often associated with older students who are expected to learn new content on their own using self-study materials (Roddy et al., 2017). This method would rely on student participation to engage independently and is therefore an approach better suited to older learners. Depending on the maturity of the student, there is no guarantee that they will oblige or cooperate with this method.

Online learning strategies: Most teachers enjoy teaching in person because they can interact with their students, share their passion for their subject and witness the ‘aha’ moments of understanding. Some teachers enjoy the performance aspect and have their own persona in the classroom, which unfortunately can get lost in translation in online delivery. Employing humour, pausing and raising voices do not necessarily have the same emphasis as they would in face-to-face teaching.

Engagement: The growing distance between a teacher and student has the potential to result in stranger anxiety. Therefore, creating a bond and trusted space with students is key in this environment. Recording our self whenever possible is a great way to bring to class. Whether by audio or video, it is a good idea to capture expertise, and our own personal style in a way that comes across with impact.

Motivation: It is easier to pick up on nonverbal cues especially when you see that your student is lost, confused or just bored in physical class but this becomes more challenging in an online environment.

Advantages of Digital Technology

1. Ability for noise removal: In IT, noise is defined as an effect that disrupts information or as an unwanted occurrence that interferes with a signal and hence the information carried by the signal. In cellular communications, noise can present itself in the form of random fluctuations within the radio wave signal that carries information, resulting in poor audio quality. Noise will always exist in all analog and digital systems, and is very difficult to remove, especially from analog systems. In digital systems, however, noise can be effectively filtered out if its level is not too great.

2. Capacity for error control: Although digital systems are highly immune to noise, not all levels of noise can be eliminated from a digital signal. If excessive amounts of noise are acting on the transmitted signal. Fortunately, in almost all digital systems, special error control schemes are applied to detect and sometimes even correct

errors when they occur. Error control schemes rely on the principle of adding extra bits to the digital information prior to transmission, so that errors can be detected if they occur after reception.

3. High speed: Digital information can be transmitted and processed at a much faster rate than analog information. Extremely high-speed communication and ultra-high-speed computing are possible because of advances in digital technology, including more refined manufacturing techniques for integrated circuits enable faster processing. Analog communication and processing have significantly lagged behind in this area

4. High level of security: Information security is of paramount concern for most applications, especially for national security and financial transactions. Sensitive information such as account numbers, personal information, and credit card numbers need to be protected, and digital systems can offer such protection. By applying efficient encryption techniques, bit streams that carry sensitive information can be made secure for transmission over vulnerable communication systems, such as telephone networks and the Internet.

5. Amenability to compression: Digital information, especially digital images and movies, is highly amenable to compression because it contains an large amount of repetition. Repeating patterns of bit streams, such as long strings of ones and zeros, are frequently found in audio and image files. Applying an assortment of compression algorithms to binary streams can achieve varying degrees of compression. Efficient compression algorithms can reduce a 20-KB file to 1 KB. Analog information is more difficult to compress.

6. Reliable storage of information: Analog storage approaches are highly susceptible to degradation because of aging and environmental factors, so digital storage formats are usually preferable. Music stored in digital form, such as on a flash drive, is less susceptible to these detrimental effects. Similarly, a letter written on paper can easily degrade over time due to moisture in the air and other factors. If the letter is scanned and stored in digital format on a hard disk, there is less chance for degradation.

7. Ease of reproduction: information on digital media such as flash drives can be reproduced with the same quality as the original, and with greater ease. A digital audio file on a flash card can be easily duplicated with the same quality as the original; all the user must do is copy the contents of the card to the computer's hard disk. The device that duplicates analog information, such as the double cassette recorder, has the difficult task of duplicating an infinite number of possible signal values stored on the magnetic tape. On the other hand, digital devices only have to duplicate two values: a one or a zero.

8. Simplicity in transmission: Digital information is easy to transmit, because the transmitter needs to generate a signal with only one of two values, such as 0 V or 2 V. Consequently, the receiver needs to follow a signal with only two values. Transmitters that have to transmit analog signals must be able to generate a signal with an infinite number of values, and the receiver has to follow this complex signal. This is clearly a more challenging task than that faced by a digital counterpart.

9. Connectivity: The world is now globalized with the invention of digital technology. It makes our friends and family closer than before. We can make communication by words, video, audio, and exchange of the media. With the creation of websites, apps, and software socialization has boomed in recent decades. The most popular social media are Facebook, Twitter, and Instagram.

10. Communication speed and versatile working: The data transfer rate or internet speed has rapidly increased since dial-up methods for internet connectivity. Broadband technology increases the speed of the internet even more. The transfer of large files instantaneously, streaming video and audio in real-time and access data virtually from anywhere in the world becomes possible with high internet speeds.

11. Digital devices are portable: Digital devices are becoming smaller and smaller day by day. The storage media can store a large amount of data in a tiny chip. With the invention of transistors, the size and weight of digital devices have greatly reduced.

12. The quality of stored information is preserved: The quality is never reduced with the use of digital technology in contrast with analog technology. The stored information in the analog system may damage or even lost or duplicated but in the digital system the case opposite.

13. Learning re-defined: Beforehand the traditional classroom is taught by teachers only. Students are completely dependent on teachers for acquiring knowledge which can be destructible since teachers are not always exactly correct. With the arrival of digital technology teachers and students, both are heavily influenced since they can jump into the internet where we can find the solution to almost every possible problem.

14. Entertainment: we can pursue our hobbies and interests through the use of digital technology. We can play online games and admit in music courses from any part of the world with the man of our choice. Different types of TV and reality shows are found on the internet which we can access with digital devices.
15. Transportation: Transportation medium such as airplanes, trains, and ships are using digital technology to accurately navigate routes in the sea and land. Not only that cars and buses are becoming fully automated in the near future. The speedometer is digital nowadays which eases the use of vehicles. Road accident and plane crash are greatly reduced with the use of digital technology.

Disadvantages of Digital Technology

1. Data security: Data security is a great concern nowadays in the digitized world. Digital technology means that a huge amount of information (text, images, and videos) is collected and stored. This stored information may be of individuals or organization which is vulnerable to theft. This data can go into the hands of criminals, terrorist, foreign enemies, etc. as all the electronic equipment are connected through the internet all around the world.
2. Social isolation: The face to face communication is rare these days with the development of digital technology. People can communicate and socialize through the internet which is a part of digital technology. This way of interacting sometimes creates ambiguity and disbelief among them. Studies have suggested that the lack of real-life contact causes depression and other forms of mental illness in many people.
3. Too much of work or work overload: As working with the use of digital technology increases speed and performance there are drawbacks of using it too. Workers from all around the world have to manage and handle large numbers of emails which can be hectic. A large amount of data needs to be recorded and analyzed on a daily basis which requires greater attention and dedication creating distress and isolation. Organizing the vast amount of data such minutes of a meeting, training videos, photographs, and reports can be a huge headache.
4. Diminishing job opportunity: Nowadays, it does not require we to be physically present in the office to do our work since we can work or perform tasks remotely with the use of the internet. The Internet allows workers from third world countries to do the same task in the minimum wage. This can reduce our job replacement opportunity. There are certain types of work that are performed by automated machines but beforehand they were done by humans. Increasingly, more digital equipment is employed in a working area reducing the chance of getting a job.
5. Digital technology creates addiction towards IT.: Online and offline computer games, messaging, social media platforms, chat rooms, dating, and other websites can be susceptible to become addictive. Internet user ends up wasting too much money for no or low return. Computer games are so addictive that they may destroy our capability and time to perform an even more important task in our daily life. Gamers and surfers spend so much time on a computer which results in addiction towards IT.
6. Manipulation of digital media: There are different ways to change, edit and manipulate digital media. Manipulation of digital media is more come than before which increases the possibility of fake reports and results inducing more confusion instead of reality. Photo-shop, after effect, are such tools which can manipulate the original data to something new creating confusion about the original ideas and thought of the writer or creator. Photographs, audio, videos are easy to edit. The size and quality of the image, the true voice of the singer are manipulated to create something new which lacks originality and true nature of the product.
7. Plagiarism and Copyright: The enforcement of copyright law is hard to implement as the information that is present in the internet world is vast and to track every data is becoming harder. Everyone can copy and paste information from the internet which is worthless as we do not spend our time learning them. Plagiarism is also the practice of taking other's work and ideas and passing them off as one's own which is becoming common in the digital world.

Conclusion

Digital technology in the classroom refers to various software and gadgets meant to help students with particular accessibility needs. The most effective way to reduce the number of repetitive, time-consuming duties a teacher undertake is to use technology in the classroom. These technologies provide students with a virtual world and the freedom to access digital knowledge according to their learning styles. Thanks to digital content production tools that customize teaching and learning, students can study at their own pace. The digital classroom uses

electronic devices and software to instruct students and incorporates technology into education. A traditional classroom is transformed into a digital classroom through computers and the Internet. Students can learn more efficiently and track their progress with the help of technology and sophisticated equipment.

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