CENTRAL PHILIPPINES STATE UNIVERSITY

Living in the IT ERA

LECTURE NOTES

Name of Student: _____

Course/Yr./Section: _____

Compiled by:

Debbie Lou Balasabas-Enquilino

Note to the Readers

This material is designed to guide you as we live in the new era, the “digital era” where technology has influenced our lives. Keeping updated to various technologies that affected our lives, knowing its pros and cons, and understand its vital role would help you to embrace the importance and impact of technology in your relationship with one another and the society in general.

As a vital component of the curriculum, this material is exclusive for second-year students enrolled in (GEL 1 – Living in the IT Era) in Central Philippines State University taking up Bachelor in Secondary Education. The coverage of this lecture notes is until Midterm. Each lesson is provided with pre-test, post-test, and activities to determine your understanding and learning.

Debbie Lou Balasabas-Enquilino

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LESSON 1: A BRIEF HISTORY OF INFORMATION TECHNOLOGY

"One of the most important things in the digital world is being able to story-tell and help people envision the art of the possible with respect to different technologies."
– Jamie S. Miller

Learning Outcomes

At the end of the lesson, students are expected to:

1. Analyze the periods of information technology and its contribution.
2. Discuss the different discoveries and inventions in all ages and the generations of computer.
3. Identify the characteristics of computer in each generation.

Introduction

We cannot imagine our world without computers!

This lesson discusses the development of computers that brings a lot of contributions to what we have known as the Digital Age or the IT Era. Because of the widespread use and availability of computers, everyone must have ample knowledge and understanding about it.

Lesson 1 discusses the following topics:

- 4 Main Periods of Information Technology
- History of Computer: Timeline
- Computer Generations

PRE-TEST

MULTIPLE CHOICE. Read and analyze the statements below. Write the letter of your correct answer on the space provided before each number.

_____1. What was the main reason why computers were developed during the 1940s?

a. To perform math
b. To send men into space
c. For business
d. To do decoding

_____2. What decade did Steve Jobs and Steve Wozniak develop the first Apple computer?

a. 1950
b. 1970
c. 1940
d. 1990

_____3. Bill Gates and Paul Allen developed

a. the first computer (Altair 8)
b. the first calculator
c. the first software (code) for the Altair 8
d. the first general-purpose computer

_____4. What does the term "bug" mean for technology?

a. Problem
b. Not enough memory
c. An insect
d. No error

_____5. The period between 1450 to 1840 where lots of technologies were developed due to an explosion of interest in computation and information.

a. Mechanical
b. Electro-mechanical
c. Pre-Mechanical
d. Electronic

_____6. The first large-scale automatic digital computer in the United States.

a. ENIAC
b. Altair 8800
c. Harvard Mark I
d. UNIVAC

_____7. A binary digital computer using punch tape

a. Mark I
b. Z1
c. Loom
d. Pascaline

_____8. He introduces the theories on interactive computing with keyboard and screen display instead of punch cards

a. Douglas Englebart
b. Steve Jobs
c. Charles Babbage
d. Bill Gates

_____9. The founder of Facebook

a. Steve Jobs
b. Mark Zuckerberg
c. Bill Gates
d. Jack Dorsey

_____10. A version of Windows which has the ability to pin applications to the taskbar and advances in tough and handwriting recognition.

a. Windows Me b. Windows 8 c. Windows 10 d. Windows 7

_____11. Introduces the first Word processor

a. MITS b. Apple c. IBM d. Microsoft

_____12. Which of the following is not a domain name?

a. .edu b. .xls c. .com d. .org

_____13. The first building blocks of Internet

a. DARPA b. ARPANET c. IBM d. Apple

_____14. The first commercial computer made in the United States

a. UNIVAC b. ENIAC c. EDVAC d. ABC

_____15. The father of modern computer.

a. Alan Turing
b. Blaise Pascal
c. Charles Babbage
d. Grace Hopper

_____ 16. The founding of Microsoft

a. 1975 b. 1974 c. 1980 d. 1976

_____17. He developed the analytical engine and the difference engine

a. Charles Babbage
b. Herman Hollerith
c. Konrad Zuse
d. Seymour Cray

_____18. The first large-scale automatic digital computer in the US.

a. EDVAC b. Harvard Mark I c. ENIAC d. IBM-701

_____19. The year when computers became available for the common people.

a. 1959-965 b. 1965-1971 c. 1946-1959 d. 1971-1980

_____20. In what year does people started connecting to the Internet?

a. 1982 b. 1999 c. 2000 d. 1994

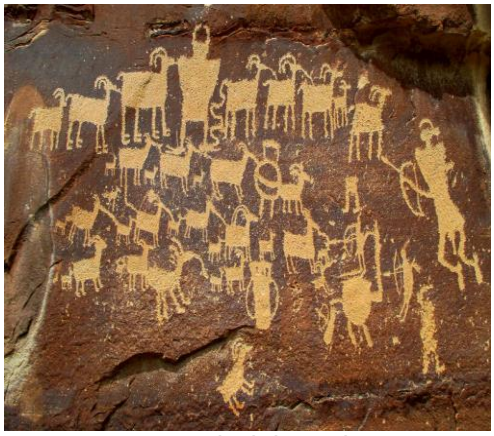
Lesson 1

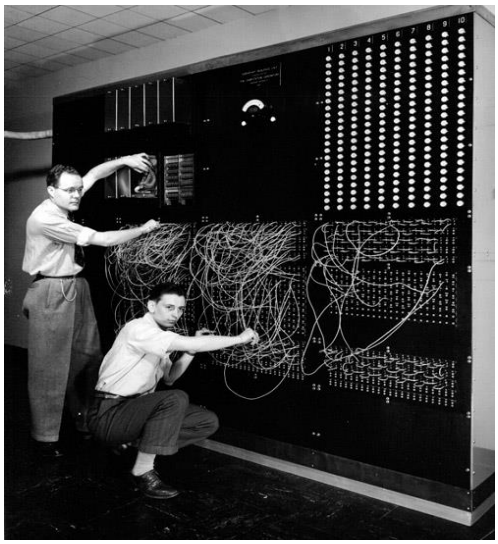
A Brief History of Information Technology

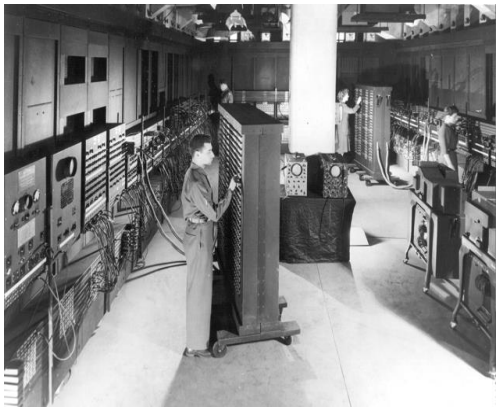
The invention of modern computers is the beginning of the rapid digitization and growth in the amount of data created, shared, and consumed that has transformed society and the way people live, work, communicate, travel, and play. In a world that is interconnected, change happens at a startling pace where they are quick to adapt to technologies for better and faster communication.

There are four (4) main periods of the history of information technology that affects us today.

4 Main Periods of Information Technology

1. Pre-Mechanical	• Between 3000 BC and 1450 A.D. • The earliest age of technology • When humans first started communicating, they used language to make simple pictures – *petroglyphs* to tell a story, map their terrain, or keep accounts such as how many animals one owned, etc. • This trend continued with the advent of formal language and better media such as rags, papyrus, and eventually paper. The first ever calculator – abacus was invented in this period after the development of the numbering systems.	 *Petroglyph in Utah*
2. Mechanical	• Between 1450 and 1840 • It started when we started the connections between our current technology and its ancestors	

	• Lots of technologies were developed due to an explosion of interest in computation and information ➢ Slide Rule/Ruler was invented (an analog computer used for multiplying and dividing) ➢ Pascaline invented by Blaise Pascal (a very popular mechanical computer capable of adding, subtracting, multiplying, and dividing two numbers) also called Arithmetic Machine) that was granted a royal privilege by King Louis XIV of France in 1649	
3. Electro-Mechanical	• Between 1840-1940 • This started the beginnings of telecommunications • The technologies invented during this period were: ➢ Morse Code, Telephone, Radio, etc. • These technologies were crucial stepping stones towards modern information systems. • The first large-scale automatic digital computer in the United States was the Harvard Mark 1 created by IBM in 1944. This 8ft x 50ft x 2ft big computer weighed a whopping five tons and had to be programmed using punch cards. Its first use was by the	 *Engineers Work on A Harvard Mark 1 (1944)*

	Manhattan Project to simulate the feasibility of an implosion to detonate an atomic bomb.	
4. Electronic	• 1940-Present • Machines invented during this period used electronic switches (vacuum tubes), instead of the electro-mechanical relays since it is more reliable. This is because it has no moving parts that would wear out. It could 'open' and 'close' thousands of times faster than relays. • ENIAC (**E**lectronic **N**umerical **I**ntegrator and **C**omputer) was the first electronic general-purpose computer invented during this period. It can solve a large class of numerical problems through reprogramming. Although it was designed and primarily used to calculate artillery firing tables for the United States Army's Ballistic Research Laboratory, its first programs included a study of the feasibility of the thermonuclear weapon.	 *Being programmed (1940s)*

Computer Generations

The development of computer systems has caused the development of different generations that resulted in the advancement in computer technology. Initially, the term "generation" distinguishes hardware technologies. However, with the advent of computer technology, it refers to a change in technology a computer is used. This does not only include hardware but both the hardware and the software that make up a computer system.

There are five computer generations as follows:

Generation	Technology/Description/Characteristics
First Generation (1946-1959)	• Computers used the VACUUM TUBE or THERMIONIC VALVE • The input of this system was based on punched cards, magnetic tape, and paper tape; the output was displayed on printouts • Computers worked on binary-coded concept or the so-called machine language (i.e. language of 0-1) Ex. ENIAC, EDVAC, UNIVAC, IBM-701, IBM-650
Second Generation (1959-1965)	• Computers that were developed used TRANSISTOR TECHNOLOGY • Size was smaller, computing time was lesser • Magnetic tape and magnetic disks were used as secondary storage devices • COBOL, FORTRAN languages were used • Computer used multi-programming operating system
Third Generation (1965-1971)	• Computers used the INTEGRATED CIRCUIT (IC) TECHNOLOGY • Size was small, computing time was lesser, consumed less power, generated less heat, maintenance cost was low • Peripherals were the same with the second generation, reel-to-reel tape for mainframes for long data storage • Computers for commercial use • High-level languages (FORTRAN-II TO IV, COBOL, PASCAL PL/1, BASIC, ALGOL-68 etc.) were used
Fourth Generation (1971-1980)	• Computers used MICROPROCESSOR TECHNOLOGY • Computers were very small in size, portable, generates very low amount of heat, fast and reliable, affordable that gives rise to Personal Computer (PC) revolution • Computers became available for the common people • Time sharing, real time networks, distributed operating system were used • All the high-level languages like C, C++, DBASE etc., were used in this generation
Fifth Generation (1980 – onwards)	• Includes hardware and software • Computers had high capability and large memory capability, fast, and performed multiple tasks simultaneously

	• VLSI (Very Large-Scale Integration) technology became ULSI (Ultra Large-Scale Integration) technology, resulting in the production of microprocessor chips having ten million electronic components • This includes Artificial Intelligence (AI), Quantum Computation, Nanotechnology, Parallel Processing, etc. • All the high-level languages like C and C++, Java, .Net etc., are used in this generation

History of Computer: Timeline

From the very start, the computer was used to solve serious number-crunching crisis and not for entertainment or merely for email purposes. Today, we carry more computing power and a lot more on our smartphones.

Hereunder is a timeline of the history of computers, how it evolved from their humble beginnings to the machines of today that surf the Internet, play games, and stream multimedia aside from doing a lot of computations.

Period	Inventor/Company	Invention and Description
300BC	Pingala	Binary Numbering System
1942	Leonardo da Vinci	Drawings depict the inventions such as flying machines, including a helicopter, the first mechanical calculator and one of the first programmable robots
1614	John Napier	Napier's Rods or Napier's Logs and Bones a system of moveable rods based on logarithms which were able to multiply, divide and calculate square and cube roots
1622	William Oughtred	Slide Rule/Slide Ruler
1623	Wilhelm Schickard	Calculating Clock
1642	Blaise Pascal	Pascaline, a mechanical adding machine
1671	Gottfried Leibniz	One of the founding fathers of Calculus
1801	Joseph-Marie Jacquard	Automatic loom controlled by punched cards
1822	Charles Babbage	Designs the first Mechanical Computer
1834	Charles Babbage	Analytical Engine
1835	Samuel Morse	Morse Code
1848	George Boole	Boolean Algebra
1853	Per Georg Scheutz & Edvard Scheutz	Tabulating Machine
1880	Alexander Graham Bell	Photophane, a telephone
1890	Herman Hollerith	Counting machine with increment mechanical counters
1896	Herman Hollerith	Forms the Tabulating Machine Company which later became IBM
1906	Lee De Forest	Electronic Tube

1911		IBM was formed (June 15)
1930	Vannevar Bush	Difference Engine, a partly electronic machine
1937	Alan Turing	Concept of Theoretical Computing Machine
1938	Konrad Zuse	Z1 Computer, a binary digital computer using punch tape
1939	George Stibitz	Complex Number Calculator, a foundation for digital computers
	William Hewlett & David Packard	Start of Hewlett Packard (HP)
	John Vincent Atanasoff & Clifford Berry	ABC (Atanasoff-Berry Computer) Prototype
1943	Alan Turing	Colossus, the code-breaking machine
1944	Howard Aiken & Grace Hopper	Mark series of computers at Harvard University
1945	John Presper Eckert & John W. Mauchly	ENIAC (Electronic Numerical Integrator and Computer)
	Grace Hopper	Coins the term computer “bug”
1946	FC Williams	Cathode-Ray Tube (CRT) storing device, the forerunner to Random-Access Memory (RAM)
1947	Donald Watts Davies & Alan Turing	Pilot Ace, the fastest digital computer in England
	William Shockley	Transistor at Bell Laboratories
	Douglas Englebart	Theories on interactive computing with keyboard and screen display instead of punch cards
1948	Andrew Donald Booth	Magnetic Drum Memory
1949	Claude Shannon	First machine that plays Chess
	Howard Aiken	Harvard Mark III
1950	Hideo Yamachito	First electronic computer in Japan
	Alan Turing	Published his paper Computing Machinery and Intelligence which helped create the Turing Test
	John Presper Eckert & John W. Mauchly	UNIVAC I (UNIVersal Automatic Computer I), the first commercial computer made in the United States
		EDVAC (Electronic Discrete Variable Automatic Computer) begins performing basic tasks. Unlike the ENIAC, it was binary rather than decimal
1954	John Backus & IBM	FORTRAN (FORmula TRANslation), a computer programming language
1955	Bell Labs	Introduces its First Transistor Computer
1958		ARPA (Advanced Research Projects Agency) and NASA (National Aeronautics and Space Administration) was formed
1960		COBOL (Common Business-Oriented Language)
1962	Steve Russel & MIT (Massachusetts Institute of Technology	Spacewar, the first computer game

1963	Douglas Englebart	Computer Mouse, nicknamed the mouse because the tail came out the end
1964	IBM	Introduces the first Word processor
	John Kemeny & Thomas Kurtz	BASIC (Beginner's All-purpose Symbolic Instruction Code)
1965	Andries van Dam &Ted Nelson	Coins the term "hypertext"
1967	IBM	Creates the Floppy Disk
1969	Seymour Cray	CDC 7600, the first supercomputer
	Gary Starkweather	Laser printer
	US Dept. of Defense	Sets-up the ARPANET (Advanced Research Projects Agency Network), the first building blocks to what the internet is today but originally with the intention of creating a computer network that could withstand any type of disaster
1970	Intel	Intel 4004, the first dynamic RAM (Random Access Memory) microprocessor
1971	Ray Tomlinson	E-mail
	James Fergason	LCD (Liquid Crystal Display)
	Sharp Corp.	Pocket Calculator
	David Noble & IBM	Floppy Disk, nicknamed "Floppy" for its flexibility
1972	Atari	Pong is released, the First Commercial Video Game
		CD (Compact Disc) was invented in US
1973	Robert Metcalfe & David Boggs	Creation of the Ethernet, a Local Area Network (LAN) protocol
		Xerox Alto, a minicomputer was a landmark step in the development of personal computers
1974	IBM	SEQUEL or SQL (Structured English Query Language)
	Charles Simonyi	Coined the term WYSIWYG (What You See Is What You Get), to describe the ability of being able to display a file or document exactly how it is going to be printed or viewed
1975	Altair	First portable Computer is produced
	Bill Gates & Paul Allen	Founding of Microsoft (April 4) to develop and sell BASIC interpreters for the Altair 8800
1976	Steve Wozniak & Steve Jobs	Founding of Apple Computers or Apple
1977		Apple Computer's Apple II, the first personal computer (PC) with color graphics was demonstrated
	Ward Christensen	Writes the program "MODEM" allowing two microcomputers to exchange files with each other over a phone line
1980	Paul Allen & Bill Gates	Creates an operating system for anew PC. They buy the rights to a simple operating system manufactured by Seattle Computer Products and use it as template to develop the DOS (Disk Operating System)

1982	Word Perfect Corp.	Introduces Word Perfect 1.0, a word processing program
		Commodore 64, becomes the best-selling computer
1983	Jon Postel, Paul Mockapetris & Craig Partridge	Domain Name System (DNS). "Top-Level" domain names are introduced: edu, com, gov, mil, net, org, and int
		MS Windows is introduced eliminating the need for a user to have to type each command like MS-DOS, by using a mouse to navigate through drop-down menus, tabs, and icons
1984	Apple Macintosh	Introduces Macintosh with mouse and window interface
1985		The first dot-com domain name is registered (March 15)
1989	Time Berners-Lee	Founding of the Internet, World Wide Web (WWW) and propose a "hypertext" system starting the modern Internet
1991	Time Berners-Lee & Robert Cailliau	WWW was launched to the public (August 6)
1993		50 WWW servers existed
1994		Yahoo was created (April)
1995		JAVA was introduced
1996		WebTV was introduced
1998	Sergey Brin & Larry Page	Google was founded (September 7)
1999		The term Wi-Fi (Wireless Fidelity) becomes part of the computing language and users begin connecting to the Internet without wires.
2004	Mark Zuckerberg	Founding Facebook Launching of Facebook (February 4)
2005		eBay acquired Skype (September 12)
		YouTube, a video sharing service was founded.
2006	Jack Dorsey	Co-Founder of Twitter
		Apple introduced the MacBook Pro, its first Intel-based, dual-core mobile computer, as well as an Intel-based iMac. Nintendo's Wii game console hits the market
2007		iPhone brings many computer functions to the smartphone
2009		Microsoft launched Windows 7, which offers the ability to pin applications to the taskbar and advances in touch and handwriting recognition, among other features
2010		Apple unveils the iPad, changing the way consumers view media and jumpstarting the dormant tablet computer segment
2011		Google released the Chromebook, a laptop that runs the Google Chrome OS
2012		Facebook gains 1 billion users on October 4

2015		Apple released the Apple Watch. Microsoft releases Windows 10
2016	Shantanu Debnath	The first reprogrammable quantum computer was created
2017		The Defense Advanced Research Projects Agency (DARPA) developed a new "Molecular Informatics" program that uses molecules as computers

Activities

ACTIVITY #1

Date: _____

Score: _____

Which of the four (4) main periods of the history of information technology greatly affects us today? Why?

ACTIVITY #2

Date: _____

Score: _____

Identify the following and indicate what generation they belong.

_____

_____

_____

_____

_____

_____

ACTIVITY #3

Date: _____

Score: _____

In your own point of view, what kind of computer will be invented next? Give a name for it. Illustrate and explain.

POST-TEST

Date: _____

Score: _____

MULTIPLE CHOICE. Read and analyze the statements below. Write the letter of your correct answer on the space provided before each number.

_____1. Bill Gates and Paul Allen developed

a. the first computer (Altair 8)
b. the first calculator
c. the first software (code) for the Altair 8
d. the first general-purpose computer

_____2. The first commercial computer made in the United States

a. UNIVAC b. ENIAC c. EDVAC d. ABC

_____3. What was the main reason why computers were developed during the 1940s?

a. To perform math
b. To send men into space
c. For business
d. To do decoding

_____4. The founder of Facebook

a. Steve Jobs
b. Mark Zuckerberg
c. Bill Gates
d. Jack Dorsey

_____5. The father of modern computer.

a. Alan Turing
b. Charles Babbage
c. Blaise Pascal
d. Grace Hopper

_____6. What decade did Steve Jobs and Steve Wozniak develop the first Apple computer?

a. 1950 b. 1940 c. 1970 d. 1990

_____7. The founding of Microsoft

a. 1975 b. 1974 c. 1980 d. 1976

_____8. What does the term "bug" mean for technology?

a. Problem
b. An insect
c. Not enough memory
d. No error

_____9. The period between 1450 to 1840 where lots of technologies were developed due to an explosion of interest in computation and information.

a. Mechanical
b. Pre-Mechanical
c. Electro-mechanical
d. Electronic

_____10. Which of the following is not a domain name?

a. .edu b. .xls c. .com d. .org

_____11. The first large-scale automatic digital computer in the United States.

a. ENIAC b. Altair 8800 c. Harvard Mark I d. UNIVAC

_____12. The first large-scale automatic digital computer in the US.

a. EDVAC b. Harvard Mark I c. ENIAC d. IBM-701

_____13. A binary digital computer using punch tape

a. Mark I b. Z1 c. Loom d. Pascaline

_____14. The year when computers became available for the common people.

a. 1959-965 b. 1965-1971 c. 1946-1959 d. 1971-1980

_____15. He introduces the theories on interactive computing with keyboard and screen display instead of punch cards

a. Douglas Englebart
b. Steve Jobs
c. Charles Babbage
d. Bill Gates

_____16. In what year does people started connecting to the Internet?

a. 1982 b. 1999 c. 2000 d. 1994

_____17. A version of Windows which has the ability to pin applications to the taskbar and advances in tough and handwriting recognition.

a. Windows Me
b. Windows 810
c. Windows 7
d. Windows

_____18. Introduces the first Word processor

a. MITS b. Apple c. IBM d. Microsoft

_____19. The first building blocks of Internet

a. DARPA b. ARPANET c. IBM d. Apple

_____20. He developed the analytical engine and the difference engine

a. Charles Babbage
b. Herman Hollerith
c. Konrad Zuse
d. Seymour Cray

LESSON 2: THE GENERATIONS

"We have the power to make this the best generation of mankind in the history of the world or to make it the last."

– John F. Kennedy

Learning Outcomes

At the end of the lesson, students should be able to:

1. Understand the characteristics of every generation to better motivate, appreciate, as well as strengthen their relationships with the people around them.
2. Analyze the potential and characteristic/s of each generation to better understand their behavior and outlook in life.

Introduction

We associate with individuals of various ages wherein dealing with them would be either easy or difficult. Knowing what generation they belong, and their characteristics would help us understand their preferences, behavior, attitude, and how to go along with them.

Lessons include:

- Which Generation Are You?
- Generation Naming
- Who are the Millennials?
- Essential Characteristics of Each Generation

PRE-TEST

Date: _____

Score: _____

MULTIPLE CHOICE. Read the statements carefully. Write the letter of your correct answer on the space provided before each number.

_____1. They are the social media-dependent and the "selfie" generation

a. GI Generation b. Baby Boomers c. Gen Z d. Millennials

_____2. They are the assertive and energetic doers, strong loyalty, and community-minded.

a. GI Generation b. Baby Boomers c. Gen Z d. Millennials

_____3. It is considered as the digital generation

a. GI Generation b. Baby Boomers c. Gen Z d. Millennials

_____4. They are those who are very cautious when it comes to marriage or dating.

a. GI Generation b. Baby Boomers c. Gen Z d. Millennials

_____5. The generation that choose to remain financial economical by letting go of extremely luxurious goods and services.

a. GI Generation b. Baby Boomers c. Gen Z d. Millennials

_____6. They prefer flexible work environments.

a. GI Generation b. Baby Boomers c. Gen Z d. Millennials

_____7. The generation that is technologically advanced, have good understanding of social media and can easily go through it.

a. GI Generation b. Baby Boomers c. Gen Z d. Millennials

_____8. A curious generation.

a. GI Generation b. Baby Boomers c. Gen Z d. Millennials

_____9. People who are born under this generation are civic-minded and loyal.

a. GI Generation b. Baby Boomers c. Gen Z d. Millennials

_____10. Millennials are born in what period?

a. 2001-onwards b. 1965-1979 c. 1980-2000 d. 1925-1945

TRUE OR FALSE. On the space provided before each number, write T if the statement is correct and F if false.

_____1. Millennials are known career shifters.

_____2. Baby Boomers are Tech-challenged.

_____3. Generation Z are multi-taskers.

_____4. Traditionalists are hardworking.

_____5. GI generation does not possess strong loyalty to jobs.

Lesson 2

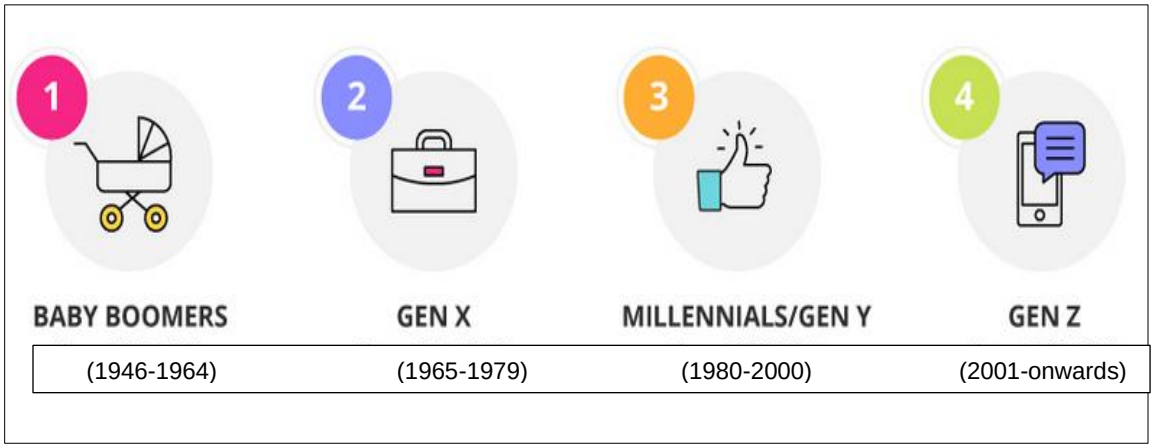
The Generations

In the 20th century, according to historians, generational naming began. The term “Lost Generation” was coined by an American writer Gertrude Stein specifically to those who were born on the 20th century whose lives were devoted to service during the World War I. In 1926 when the epigram to Ernest Hemingway's "The Sun Also Rises," was published, Stein also wrote, "You are all a lost generation."

The term “Generations” according to Rosenberg (2020), is defined as social groups of people born within a defined period that share similar cultural traits, values, and preferences.

Which Generation Are You?

Three key trends shape generations, namely: parenting, technology, and economics. These generation names and age spans differ depending on the country and/or region as presented in the figure below.



Generation Naming According to Neil Howe and William Strauss

Period	Generation
1900 – 1924	G.I. Generation (Generation Interconnection)
1925 – 1945	The Silent Generation
1946 – 1964	Baby Boomers
1965 – 1979	Thirteeners or Generation X (GenXer)
1980 – 2000	Millennials or Generation Y
2001 – onwards	New Silent Generation or Generation Z

Who are the Millennials?

Millennial varies across regions and not all of them possess the same character they are described as.

Millennials are born between 1980 to 2000 considered as the dawn of the new age and are called the first digital natives (TIME Magazine). They are socially connected via multiple devices and are in some instances bordering on the obsessed with social media, as with selfies. According to the Philippines Association of National Advertisers/PANA.com.ph, one-third of the population in the Philippines is made up of millennials aging 15 to 35 years old.

In America, Millennials comprise the biggest age grouping in history mostly teens and 20-something. They are the people who are already in college and part of the workforce and belong to Generation Y. William Strauss and Neil Howe were credited for naming the “millennials.”

In the Philippines, Millennials are described as those who are social media-dependent and the “selfie” generation. According to The Week, they are usually the spendthrifts or described as “broke” meaning, they are known to usually spend on luxury goods which leave their bank accounts shaken. Millennials are also described as narcissists, making them known as the “Me, Me, Me Generation.” However, millennials also possess good attitudes: being politically and socially-engaged compared to other generations. When it comes to issues, they have something to say and are more involved with politics.

Talking about entertainment, millennials spend more time online, watching YouTube videos. They have the latest apps, watch the latest TV series, and are into the latest hits. According to a Philippine Star article, in the Philippines millennials do not read newspapers more often, instead, they depend on Google for information or Waze for road directions.

Another description for millennials is: upbeat, lazy, narcissistic, materialistic, self-expressive, fun-loving, and liberal. Their attention span is very short but, if you discuss things that interest them (e.g. tattoos, trivia, gaming, movies, and the likes), they’re really the one to talk.

Another thing is, millennials have their own personalities aside from age difference. According to Time, millennials have a mantra of “Challenge convention” where they find better ways of doing things. When they were babies, technology was already available. The millennialmarketing.com reveals that 56% of millennials are not afraid to try new technologies, thus, many businesses target them for their products. 75% want to travel abroad making them a target for travel-related goods (Valeriano, J., 2016)

Millennials are also known as career-shifters where they jumped from one field into another making career as “self-discovery.” According to Mr. Jos Ortega of Havas Media Ortega, millennials are characterized in different identities. “Who they are on Facebook may not necessarily be who they are in real life, on Instagram, or on Twitter,” said Ortega. Diversity is what makes a millennial and they have different versions of themselves depending on what they want to show the world.

Essential Characteristics of Each Generation

A) GI Generation

They saved the world and then built a nation. They are the assertive and energetic doers, excellent team players, community-minded, strongly interested in personal morality and near-absolute standards of right and wrong, has strong sense of personal civic duty, strong loyalty to jobs, groups, schools, etc. They believe that marriage is for life and the saying "use it up, fix it up, make it do, or do without".

B) Traditionalists or Silent Generation

1. **Hardworking.** They believe that you earn your own way through hard work, thus, promotions and advancements should be the result of tenure and proven productivity. They distrust flash-in-the-pan successes.

2. **They have Willpower.** Silent Generation survived great depression. They were often forced to take jobs that didn't necessarily appeal to them. They took what work was available if and when it was available, and they were grateful for it.

3. **Loyal Employees.** Traditionalists are civic-minded and loyal to their country and to their employers and stayed with the same employer throughout their entire working lives. They're less likely to change jobs to advance their careers than younger generations, but they expect the same loyalty in return.

4. They Respect Authority. They are raised and taught to respect authority. Conformity and conservatism are prized. They tend to be good team players. They generally don’t initiate conflict in the workplace, and they like to feel needed.

5. Waste Not, Want Not. Traditionalists tend to be thrifty. They'll diligently maintain what they own to extend the property's lifespan.

6. Can Be Tech-Challenged. They are the slowest to change their work habits and to adapt to new, more efficient ways of doing things. Traditionalists might struggle to learn new technology as it evolves and changes the practice of law. They often have great one-on-one interpersonal skills because they're more accustomed to

dealing with people eye-to-eye. They've honed their abilities to use this to their advantages.

7. They're Traditional. Traditionalists value old-time morals, safety, security, and consistency. They have more respect for brick-and-mortar educational institutions and traditional lecture formats than online, web-based education and training. This generation favors conventional business models in the legal workplace and a top-down chain of command. Work ethic and reliability are important to them.

C) Baby Boomers

1. Motivated to Work. Baby boomers have good work ethics and do not shy away from hard work. They also take pride in their employment status. It has been observed that some of their self-worth arises from their achievements in their careers. They are known to have put in tremendous hard work and effort into their work. Therefore, it can be difficult in finding a balance between professional and personal lives. They are motivated individuals owing to their working ethics.

2. Smart Decision-Making Abilities. As this generation has been very dedicated to their work, they are influenced by rational decision making. It is a multi-step process for deciding between alternatives. Baby boomers favor objectivity, logic, as well as reliable analysis while making decisions. The generation is highly disciplined, and this is important for them to factor in the same during the process.

3. Self-assured Nature. Baby boomers were brought up in structured and disciplined houses. They have the defining characteristics of being mature, independent, and responsible. They have healthy as well as analytical decision-making skills. They are also not hesitant to question something if they do not concur with it due to these traits. They are not afraid to voice their opinions.

4. Competitive in Nature. One of the significant motivators for baby boomers for excelling in their professional lives was competitiveness. The generation likes setting personal goals and achieving them. They always want to perform better than their colleagues in an office environment. Baby boomers are driven by factors, including personal growth and self-improvement.

5. Dedication towards Goals. Baby boomers are very goals-oriented. They like to set goals for themselves and achieve them. In workplaces, they also want to be assigned with goals to reach. This characteristic applies to both their personal and professional lives. Baby boomers want to grow and progress in life. They are highly motivated and focused individuals.

6. Highly Resourceful. One of the most popular traits of baby boomers is their resourcefulness. As their parents lived through the Great Depression, baby boomers have

learned to utilize whatever they have had available to them. This generation can use every resource they have available. They also have the capability of solving a problem or dealing with a challenge using bare necessities as well.

7. Confident in Nature. The generation has significant confidence in the future. They are known for their confident and positive attitude towards the future, and they hope that the future holds prosperity and comfort. The reasons supporting this attitude include the fact that they have watched people in business grow and reap profits during their time. They have also observed how labor unions have helped better the working conditions of the people. They have also seen a rise in wages and increasing access to education and schools.

8. Disciplined in Nature. Baby boomers have grown up in well-structured and disciplined households. This has immensely helped shape them into the individuals they are currently. They pay heed to all the associated rules and regulations, and they try to follow those rules. They follow the work ethics and work towards the common business goal in a well-dedicated manner.

9. Liberal for Cultural Identities. The generation had grown up when there was a lot of significant social change going on. Baby boomers were also more liberal and found music as another way of expressing their generational identity. They associated with the rock and roll genre, noticeably. Baby boomers are associated with having traits, such as free-spirited, social cause-oriented, individualism, and experimental.

10. Focused on Nature. Baby boomers are also very concentrated, mentally. They know how to concentrate on a particular topic or subject. They do not get distracted easily, and thus, have great attention spans. This helps them stay on track. They also take their own time to understand something as they concentrate on each aspect of the task at hand and commit it to their long-term memory.

11. Team Oriented. While baby boomers are competitive, they also like working in teams. They have a strong sense of community, unlike other generations. They want to work in collaboration with their peers in the same as well as different teams. As they like to perform better than their colleagues in an office environment, they also like working in teams and growing collectively. They want the healthy competition. The generation is driven by factors including personal as well as collective growth and self-improvement.

12. Aware of Civil Rights. Baby boomers are more conservative as compared to their succeeding generations. The generation opted to show their opinions on civil rights through non-violent protests and tactics. These tactics are still practiced to approach any challenges faced by the people. As Times Magazine once said, the generation's reformist energy has surfaced through many grass-roots movements that are aimed at curing everything from the arms race to drunken driving. The production was also involved in fighting for equal rights for both women and men. Owing to the tireless work of the Baby

Boomer's Generation's female leaders and many others, we now have equal career opportunities.

D) Generation X

1. **Entrepreneurial.** Generation X has good work ethics and does not shy away from hard work. They also take pride in their employment status. However, they are more likely to be self-established than being associated with a company. They are also known for entrepreneurial skills. They are known to have put in tremendous hard work and effort into their work. They are motivated individuals owing to their working ethics.

2. Focused. Generation X is also very concentrated, mentally. They know how to concentrate on a particular topic or subject. They do not get distracted easily, and thus, have great attention spans. It helps them stay on track. They also take their own time to understand something as they concentrate on each aspect of the task at hand and commit it to their long-term memory. They like to learn new things and make contributions.

3. Personal Life. This generation has grown up witnessing divorces and violence, and thus, they are very cautious when it comes to marriage or dating. They take their time with marriage and often choose to do so after cohabitation. Divorce is common, and many generation X people are single parents. They are increasingly individualistic and are self-reliant. They are not easily impressed with authority and are quite cautious.

4. Technology. Gen X remembers a time when they were in school and computers were not yet available. Then around the middle or high school, there was a sudden rise in personal computing as there was the introduction of computers. As compared to Baby Boomers, they are more digitally advanced and are usually willing to carry out their financial management and research activities online.

E) Generation Y

1. Curiosity. Gen Y is a curious generation in general. They are eager to learn and develop new skills and have a broader mindset to understand various things. They are also willing to put in the time and effort to build themselves into better employees as well. Moreover, millennials do not want to stick around at the same job for years on end to finally receive a promotion. Thus, if companies come up with innovative programs that create new paths of professional development, millennials are likely to feel attracted to such opportunities.

2. Individuality. All millennials are unique in their ways and have their personalities. Modern businesses have now started taking an individualistic approach while managing millennials employees. It is a company's responsibility to make their employees comfortable and have their ideas heard. Companies have begun to understand that the individuality of the millennials is the factor that leads to a robust millennial

workforce. Millennials hold different professional goals, aspirations, and personalities, and this is an essential factor for business leaders to understand. While investing efforts into the company, millennials also expect to have professional and individualized growth as well.

3. Social Awareness. Millennials like to give back to the community. Companies, for instance, Salesforce, have helped them focus on social issues and give back. Salesforce encourages all of its employees to donate to charity by giving in their time. They also let them do so during working hours. Millennials have been mainly observed to care about social causes, for instance, social equality and climate change. By helping them make a change, a company can drive their motivation to work as well. A company should create a strong link between positive social change and the business's success.

4. Financial Stability. Millennials are driven towards making decisions that lead to financial stability instead of becoming rich. It is due to the after-effects of the Great Recession. It had a significant impact on Gen Y.As a result of this as well as of student debt, millennials choose to remain financial economical by letting go of extremely luxurious goods and services. If companies offer benefits, such as tuition assistance, for instance, millennials will be attracted to such workplaces.

5. Innovations in Technology. Millennials are particularly a digital generation. They were born right around the time when cellphones, the internet, and computers were introduced into the market. Thus, it is no wonder that while millennials are tech-savvy, they also have an obsession with technology. Millennials are technically advanced owing to the rapid proliferation of the internet as well as the growing age of digitization. They are always surrounded by technology. They have grown up in an environment that was increasingly being filled by electronics and was coming online and being socially connected.

6. Multi-taskers. The generation is good at multi-tasking and can handle multiple tasks and responsibilities at the same time. However, they are usually also easily distracted as they find social media hard to resist.

7. Work and Life Balance. The generation likes to maintain a healthy balance between their professional and personal lives. Unlike other generations, gen Y is not willing to compromise on this factor. While the generation is also hard-working like their previous generations, they also prefer flexible work environments. Work from home allowance is also the right way of keeping a millennial workforce happy and satisfied.

F) Generation Z

1. Innovations in Technology. Gen Z is a digital generation just like Gen Y who are born into a time of rapid digitization have great obsession with technology. Thus, they are still tech-savvy while they are not very old. This is because Gen Z is surrounded by technology like smartphones, laptops, smart devices and wearables, and even, smart home automation, among others.

2. Connected. As Gen Z is a technologically advanced generation, they are also very connected. They have a good understanding of social media and can easily find their way through it. If a company does not use social media to spread awareness about themselves and their brand, the generation will not be attracted to the products or services it offers. Thus, companies can engage with this generation well by using various social media platforms. They can also talk about things that their followers might find interesting. However, this generation is also overly saturated with brands.

3. Lifestyle. Generation Z is highly accustomed to the high standards of technology and having numerous sources for information. They value authenticity, peer acceptance, security which holds significant importance. They are very optimistic, confident in what they do; and the same with the millennials, they want to create an impact or contribute to the world.

Activities

ACTIVITY #1

Birthday: _____ **Date:** _____

Score: _____

What generation do you belong? What makes you different from other generations? What is your philosophy and motto in life? What are your strong and weak points? Are you active in the use of technology? How often and for what purpose?

ACTIVITY #2

Date: _____

Score: _____

If you will be asked to give your opinion, what will be the name of the next generation? What do you think would be their characteristics?

POST-TEST

Date: _____

Score: _____

MULTIPLE CHOICE. Read and analyze the statements below. Write the letter of your correct answer on the space provided before each number.

_____1. They prefer flexible work environments.

a. GI Generation b. Baby Boomers c. Gen Z d. Millennials

_____2. People who are born under this generation are civic-minded and loyal.

a. GI Generation b. Baby Boomers c. Gen Z d. Millennials

_____3. The generation that is technologically advanced, have good understanding of social media and can easily go through it.

a. GI Generation b. Baby Boomers c. Gen Z d. Millennials

_____4. They are those who are very cautious when it comes to marriage or dating.

a. GI Generation b. Baby Boomers c. Gen Z d. Millennials

_____5. They are the assertive and energetic doers, strong loyalty, and community-minded.

a. GI Generation b. Baby Boomers c. Gen Z d. Millennials

_____6. Millennials are born in what period?

a. 2001-onwards b. 1965-1979 c. 1980-2000 d. Millennials

_____7. It is considered as the digital generation

a. GI Generation b. Baby Boomers c. Gen Z d. Millennials

_____8. The generation that choose to remain financial economical by letting go of extremely luxurious goods and services.

a. GI Generation b. Baby Boomers c. Gen Z d. Millennials

_____9. They are the social media-dependent and the “selfie” generation

a. GI Generation b. Baby Boomers c. Gen Z d. Millennials

_____10. A curious generation.

a. GI Generation b. Baby Boomers c. Gen Z d. Millennials

TRUE OR FALSE. On the space provided before each number, write T if the statement is correct and F if false.

_____1. Millennials are known career shifters.

_____2. GI generation does not possess strong loyalty to jobs.

_____3. Generation Z are multi-taskers.

_____4. Baby Boomers are Tech-challenged.

_____5. Traditionalists are hardworking.

LESSON 3: THE RISE OF THE INFORMATION TECHNOLOGY ERA

"First we thought the PC was a calculator. Then we found out how to turn numbers into letters with ASCII – and we thought it was a typewriter. Then we discovered graphics, and we thought it was a television. With the World Wide Web, we've realized it's a brochure."

– Doughlas Adams

Learning Outcomes

This lesson aims to let the students to:

. 1. Learn the importance of the internet and the World Wide Web.
2. Link learned concepts to the development of the information age and its impact on society.
3. Identify search engines and web browsers that allow users to search the web.
4. Identify the function of web browser.
5. Discuss the parts of an email and the Uniform Resource Locator or URL.

Introduction

Technology has changed the way we live, learn, work, and play. Knowing the information about the Internet, the World Wide Web, Search Engines, Web Browsers, Email, and the URL would help us understand its importance why it came into existence. These things will assist us to connect to the world and our loved ones. This lesson discusses the following:

- Information Age and the Internet
- History of the Internet
- Internet Timeline
- World Wide Web
- Difference Between Internet and the WWW
- What is Search Engine?
- Examples of Search Engines
- What is a Browser?
- Early Beginnings of the Web Browser
- What Does a Web Browser Do?
- Examples of Web Browser
- Brief History of Electronic Mail

- What is Electronic Mail or Email?
- The @ Symbol
- What is a URL?
- Where is the URL Located?

PRE-TEST

Date: _____

Score: _____

MULTIPLE CHOICE. Read and analyze the questions. Write the letter of your correct answer on the space provided before each number.

_____1. A network that connects millions of computers for communication and sharing of resources.

a. WWW b. Internet c. WiFi d. IP

_____2. In what year does the Internet came into existence?

a. 1991 b. 1989 c. 1969 d, 1978

_____3. WAN or Wide Area Network was created on

a. 1972 b. 1965 c. 1969 d. 1984

_____4. The first internet connection was known as

a. SDN b. DSN c. DNS d. SND

_____5. Are programs which are needed to extract the information from the internet.

a. Browser c. Website
b. Search Engine d. Productivity

_____6. It stores data to facilitate fast and accurate information retrieval.

a. We Crawling b. Searching c. Indexing d. Saving

_____7. A software that allows a user to locate, access, and display web pages.

a. HTML b. Search Engine c. Browser d. Utility

_____8. He invented the Electronic Mail or Email.

a. Jack Dorsey c. Daniel Karrenberg
b. Jean Armour Polly d. Ray Tomlinson

_____9. Who established the first Internet connection in Asia?

a. Kilnam Chon
b. Jean Armour Polly
c. Breandan Kehoe
d. Paul Baran

____10. It handles the HTTP activity between the client and the server.

a. Search Engine b. Web Browser c. Chrome d. URL

____11. Which of the following is not part of an email address?

a. Domain Name b. Username c. @ sign d. URL

____12. The s in https means

a. Simple b. Secure c. Stable d. Sample

____13. The first email message sent was

a. QWERTYUIOP
b. QWTEYRIOPU
c. QWRETYUIOP
d. QWYERTUIOP

____14. Which of the following is not a Web Browser?

a. Google Chrome b. Yahoo c. Opera d. Safari

____15. A massive collection of digital pages to access information over the internet.

a. HTML b. WWW c. HTTP d. URL

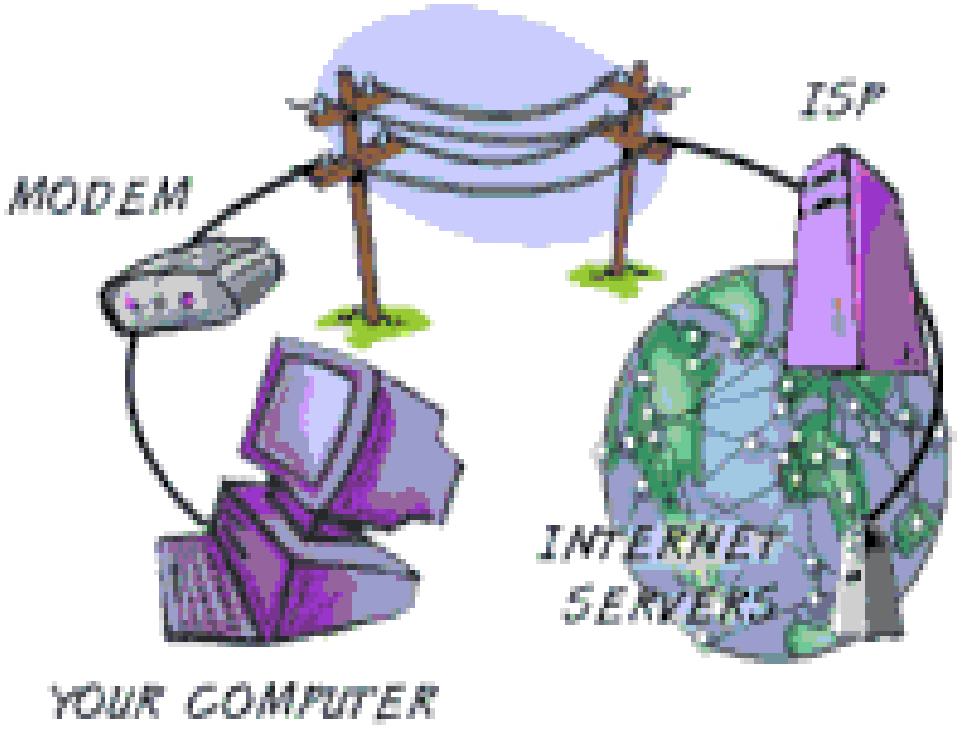
Lesson 3

The Rise of the Information Technology Era

Information Age and the Internet

The advent of electronic computers has made the information age possible. This is characterized by the shift from traditional industry to an economy-based on information digitization. The onset of the Information Age is associated with the Digital Revolution, just as the Industrial Revolution marked the onset of the Industrial Age. It was conceived that the Internet was a fail proof-network that could connect computers together and be resistant to any single point of failure. When large areas are disabled, information can be easily rerouted through e-mail and computer file transfer.

Since the existence of Internet in 1969, and the invention of the WWW (World Wide Web) in 1989, and its introduction in 1991, the Internet became easily accessible. It grew into a global platform for accelerating the flow of information today that in turn made older forms of media to become obsolete.

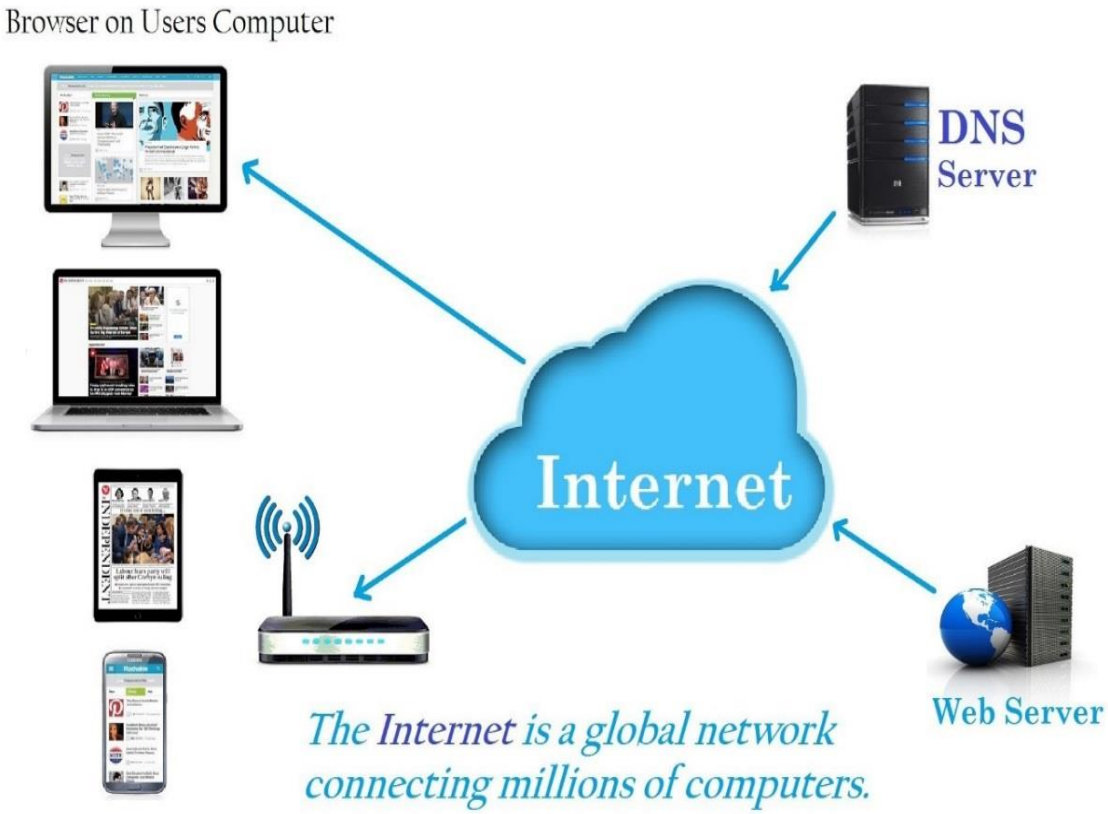


An illustration from the days of modem-connectivity to the web.

History of the Internet

Today we live in a world of technology, where internet spins a web of interconnectivity around the globe. Through Internet more than fifty million people in countries around the world have been connected. Internet was evolved in 1969, under the project called ARPANET (Advanced Research Projects Agency Network) to connect computers at different universities and U.S. defense. Soon after the people from different backgrounds such as engineers, scientists, students and researchers started using the network for exchanging information and messages.

Internet (Interconnected Network) is a network of networks that connects millions of computers to form a network and communicating with each other for sharing resources. You can get information, access data, communicate with others, shop, play games and many more by connecting your computer through Internet. The World Wide Web (WWW) or web is a platform with various websites that helps you to access global information over the Internet. A web-browser application is mainly important that helps you to access all the information's from various websites through Internet. So, Internet is everything and needs many things that can help you gather information from the worldwide.



The Internet has been the main source in different fields like Education, Science, research and others to develop, design and do many other things. It is a tangible entity that relies on physical infrastructure to connect a network to other networks. The Internet concept was first coined through networking by J C R Liklider in 1962 which initially termed as Galactic Network which was used to interconnect a set of computers for accessing data and programs. Since then DARPA (Defense Advanced Research Projects Agency) concept came into existence and finally ARPANET where the first host computer was connected. The ARPANET was used earlier as a networking technology for first electronic mail messaging service. Finally, ARPANET became the internet which works on multiple independent networks with its network architecture design. The packet switching method also introduced between networks that makes data communication from one place to another easy.

On October 24, 1995 a resolution proposing the term as Internet with various members of Internet and intellectual property communities was passed. The resolution states that Internet is a global information system which is logically linked by global unique space address based on IP or Internet Protocol and support communications using TCP or Transmission Control Protocol. It also states that it provides the users accessible to all the services privately or publicly for communications. Since then, with large evolution and technology the networking concept has changed. There came peer to peer, client/server model and more that allows connecting personal computers to a network. Physical cables, telephone wires, networking devices, LAN, WAN and various others also came into existence to the new generation that distribute the networks globally. There are various connection types like wired, wireless, 2G, 3G and 4G that leads to increase the network capacity overall.

Internet Timeline

Year	Developments
1962	J.C.R Liklider first coined the concept of intergalactic network of networked computers after ARPA (Advanced Research Projects Agency) was created by US Government and packet switching was introduced by Leonard Kleinrock
1964-1967	A typical packet switching network was created by Donald watts Davies at National physical laboratory, Britain which revolutionizes the data communications in various fields. Additionally, the message blocks concept was also passed during data communications by Paul Baran from Rand corporation, US
1965	WAN or Wide area network was created connecting through long distance dial-up between TX-2 computer in Massachusetts and Q-32 computer in California. The packet switching term also comes into existence for better data communications
1969	ARPAnet's structure proposal was written to design the network structure. The physical Interface Message Processor (IMP) was designed that links to four different universities and data packets are send between networked computers

1972	IMP network also rapidly increases with 23 hosts. Eventually the e-mail or electronic mail was introduced by Ray Tomlinson that can send messages across distributed networks. Packet switching was done by connecting 20 different computers and first Internet address registry was created
1973	the era where first TCP/IP protocol and Ethernet was invented that interconnects various computer networks for communicating with each other. The TCP allows the users to login to a remote computer and download files
1982	The first Internet connection was established in Asia by Kilnam Chon which is known as SDN (Software-Defined Networking) and later termed as Internet
1983	The first DNS or Domain name system was introduced with network addresses to identify an organization by .edu, .com, .org etc.
1984	The first UNIX network was developed in Japan and the first e-mail was received in Germany
1988	The first Internet exchange point was established by connecting TCP/IP networks and first commercial and non-commercial Internet networks. It was also the year when the first ISP or Internet Service provider was created by Daniel Karrenberg
1989	Internet is growing worldwide and Dr. Stephen Goldstein plays an important role of evaluating and funding for development of Internet. It then helps to connect about 25 countries to NSFNET. After then the first WWW or World Wide Web was created by Berners-Lee and a first web-browser application for Mac OS
1991	World Wide Web is available for public use over the Internet that has loads of information in various fields
1992	The first surfing the Internet was used by Jean Armour Polly and net surfing was coined by Brendan Kehoe in a USENET post. It's also the time when audio and video multicast came into existence
1994	The first website was launched by White house named as WWW.Whitehouse.gov and then many other commercial websites were launched
1998	Google opens its first office in California and web publishing tools were introduced
1999	Browsers came into existence where Netscape and Microsoft shares almost hundred percent of market. Napster was introduced for music rights

What is a Word Wide Web?

The World Wide Web was invented by Tim Berners-Lee in 1989, in 1995 the first connection was established over what is today known as the internet. By the end of 1990, the first Web page was served. In April 1993, the World Wide Web technology was available for anyone to use on a royalty-free basis. Since that time, the web has changed the world. It became the most powerful communication medium the world has ever known.

A global web of computers known as the Internet, allows individuals to communicate with each other often called the world wide web. The Internet provides a quick and easy exchange of information and is recognized as the central tool in this Information Age.

The World Wide Web (WWW) is an internet-based service, which uses common set of rules known as protocols, to distribute documents across the Internet in a standard way.

The World Wide Web or “Web” is a part of the Internet. The Web is viewed through web browser software such as Google chrome, Internet Explorer, Mozilla Firefox etc. Using browsers one can access the digital libraries containing innumerable articles, journals, e-books, news, tutorials stored in the form of web pages on computers around the world called web servers-Today, thousands of web pages/websites are added to the WWW every hour.

The Difference Between Internet and World Wide Web

The Internet is known as “interconnection of computer networks”. The Internet is a massive network of networks. It connects millions of computers together globally, forming a network in which any computer can communicate with any other computer as long as they are both connected to the Internet. Information that travels over the Internet does so via a variety of languages known as protocols.

The World Wide Web, or “Web” for short, or simply Web, is a massive collection of digital pages to access information over the Internet. The Web uses the HTTP protocol, to transmit data and allows applications to communicate in order to exchange business logic. The Web also uses browsers, such as Internet Explorer or Firefox to access web documents called Web pages that are linked to each other via hyperlinks. Web documents also contain graphics, sounds, text and video.

What is Search Engine?

Search engines are the programs which are needed to extract the information from the internet. They play a very important role in our daily routine. as today for each and every information we are dependent on internet.

Web search engines work with the help of two programs, Spider which fetches as many documents as possible. Another program, called an indexer, reads the documents and creates an index based on the words contained in each document. Each search engine uses an algorithm to create its indices such that, only related results for specified keywords is stored and returns a list of the documents where the keywords were found.

A Search Engine Works in the Following Order:

Web crawling: Web search engines work by storing information about many web pages. These pages are retrieved by the program known as web crawler – which follows every link on the site. Web crawler may also be called a web spider.

Indexing: Indexing also known as web indexing, it stores data to facilitate fast and accurate information retrieval.

Searching: A web search query fetches the result from the web search engine entered by the user to meet his information needs.

Examples of Search Engines

What is a Browser?

According to Techopedia.com, a web browser is a software program that allows a user to locate, access, and display web pages. In common usage, a web browser is usually shortened to "browser."

Web browsers are used primarily for displaying and accessing websites on the internet, as well as other content created using languages such as Hypertext Markup Language (HTML) and Extensible Markup Language (XML).

Browsers translate web pages and websites delivered using Hypertext Transfer Protocol (HTTP) into human-readable content. They also have the ability to display other protocols and prefixes, such as secure HTTP (HTTPS), File Transfer Protocol (FTP), email handling (mailto:), and files (file:).

In addition, most browsers also support external plug-ins required to display active content, such as in-page video, audio and game content.

Early Beginnings of the Web Browser

Early web browsers started prior to the beginning of the 21st century, with a text-only browser called Lynx and another browser called Mosaic. Later, Netscape Navigator and Microsoft Internet Explorer emerged as the two main choices, until the launch of Mozilla Firefox in 2004. Meanwhile, Apple's Safari products launched in 2003, and became the standard operating system for the company's iPhones in 2007.

Since then, Google Chrome has also become a contender in the browser wars – the competition to power the bulk of end user activity.

What Does a Web Browser Do?

Essentially, a web browser handles HTTP activity between a client and a server that is the backbone of World Wide Web use. URLs are traffic directions for the web browser, and the browser uses IP addresses and other tools to establish these connections.

Along with facilitating web surfing, new types of web browsers have additional functionality through a range of plug-ins that can add features after the fact. Some of these have to do with security and accessibility, while others have to do with end user conveniences or data aggregation.

Examples of Browsers

Google Chrome 	**Mozilla Firefox** 	**Opera** 	**Safari** 	**Internet Explorer** 
Slimjet 	**Maxthon** 	**SlimBrowser** 	**Netscape** 	**UC** 

Brief History of E-Mail

Computer engineer Ray Tomlinson invented internet-based email in late 1971. Under ARPAnet, several major innovations occurred: email (or electronic mail), the ability to send simple messages to another person across the network (1971). Ray Tomlinson worked as a computer engineer for Bolt Beranek and Newman (BBN), the company hired by the United States Defense Department to build the first Internet in 1968.

Ray Tomlinson was experimenting with a popular program he wrote called SNDMSG that the ARPANET programmers and researchers were using on the network computers (Digital PDP-10s) to leave messages for each other. SNDMSG was a "local" electronic message program. You could only leave messages on the computer that you were using for other persons using that computer to read. Tomlinson used a file transfer protocol that he was working on called CYPNET to adapt the SNDMSG program so it could send electronic messages to any computer on the ARPANET network.

The first email was sent between two computers that were actually sitting beside each other. The ARPANET network was used as the connection between the two.

The first email message was "QWERTYUIOP". Ray Tomlinson is quoted as saying he invented email," mostly because it seemed like a neat idea." No one was asking for email.

What is an Electronic Mail or Email?

Electronic mail (email) is a way of exchanging digital messages between people using different computers.

Email operates across computer networks, which in the 2010s, pretty much means the internet. Some early email systems required the writer and the recipient to both be online at the same time, sort of like instant messaging. Today's email systems are based on a store-and-forward model. Email servers accept, forward, deliver, and store messages. Neither the users nor their computers are required to be online simultaneously; they need to connect only briefly, typically to a mail server, for as long as it takes to send or receive messages.

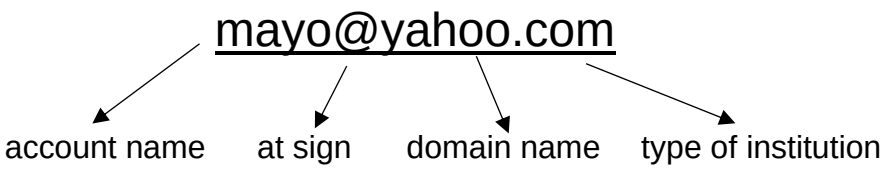
By 1993 the word “electronic mail” had been replaced by “email” in the public lexicon and internet use had become more widespread.

The @ Symbol

Ray Tomlinson chose the @ symbol to tell which user was "at" what computer. The @ goes in between the user's login name and the name of his/her host computer.

Indicating a destination for a message became as simple as addressing it: “username@name of computer”**,** which is essentially how email has been addressed ever since.

Example:



What is a URL?

Also known as a web address, a URL (Uniform Resource Locator) is a form of URI and a standardized naming convention for addressing documents accessible over the Internet and Intranet. An example of a URL is https://www.computerhope.com, which is the URL for the Computer Hope website.

http:// or https://

The "http" stands for Hypertext Transfer Protocol. It lets the browser to know which protocol it is going to use to access the information specified in the domain. An "https" protocol is short for "Hypertext Transfer Protocol Secure" and indicates that information transmitted over HTTP is encrypted and secure. After the http or https is the colon (:) and two forward slashes (//) that separate the protocol from the remainder of the URL.

www.

Next, "www" stands for World Wide Web and is used to distinguish the content. This portion of the URL is not required and many times can be left out. For example, typing "http://computerhope.com" would still get you to the Computer Hope website. This portion of the address can also be substituted for an important subpage known as a subdomain.

computerhope.com

Next, "computerhope.com" is the domain name for the website. The last portion of the domain is known as the domain suffix, or TLD (Top Level Domain). It is used to identify the type or location of the website. For example, ".com" is short for commercial, ".org" is short for an organization, and “. co.uk" is the United Kingdom.

/jargon/u/

Next, "jargon" and "u" are the directories where the web page is on the server. In this example, the web page is two directories deep. To find the file on the server, it would

be in the */public_html/jargon/u* directory. With most servers, the public html directory is the default directory containing the HTML files.

url.htm

Finally, url.htm is the actual web page on the domain you're viewing. The trailing .htm is the file extension of the web page that indicates the file is an HTML file. Other common file extensions on the Internet include .html, .php, .asp, .cgi, .xml, .jpg, and .gif. Each of these file extensions performs a different function, like all the different types of files on your computer.

Example:

Where is the URL Located?

A URL is located at the top of the browser window in the address bar or omnibox depending on your browser window. On desktop computers and laptop, unless your browser is being displayed in full screen the URL is always visible. In most smartphone and tablet browsers, the address bar containing the URL will disappear as you scroll down and only show the domain when visible. When the address bar is not visible, scroll up the page. If only the domain is shown, tapping on the address bar shows the full address.

Activities

ACTIVITY #1

Date: _____

Score: _____

What do you think is the difference between http and https? Is the suffix **s** really matters? Please discuss.

ACTIVITY #2

Date: _____

Score: _____

Make a write-up on “A Day Without Technology”. Limit your words to 250 only.

ACTIVITY #3

Date: _____

Score: _____

In searching the Web, what search engine and web browser do you commonly use? and why?

POST-TEST

Date: _____

Score: _____

MULTIPLE CHOICE. Read and analyze the statements below. Write the letter of your correct answer on the space provided before each number.

_____1. The first email message sent was

a. QWERTYUIOP
b. QWTEYRIOPU
c. QWRETYUIOP
d. QWYERTUIOP

_____2. Are programs which are needed to extract the information from the internet.

a. Browser
b. Search Engine
c. Website
d. Productivity

_____3. It stores data to facilitate fast and accurate information retrieval.

a. We Crawling b. Searching c. Indexing d. Saving

_____4. He invented the Electronic Mail or Email.

a. Jack Dorsey
b. Jean Armour Polly
c. Daniel Karrenberg
d. Ray Tomlinson

_____5. A network that connects millions of computers for communication and sharing of resources.

a. WWW b. Internet c. WiFi d. IP

_____6. Which of the following is not a Web Browser?

a. Google Chrome b. Yahoo c. Opera d. Safari

_____7. In what year does the Internet came into existence?

a. 1991 b. 1989 c. 1969 d, 1978

_____8. WAN or Wide Area Network was created on

a. 1972 b. 1965 c. 1969 d. 1984

_____9. It handles the HTTP activity between the client and the server.

a. Search Engine b. Web Browser c. Chrome d. URL

_____10. The s in https means

a. Simple b. Secure c. Stable d. Sample

_____11. The first internet connection was known as

a. SDN b. DSN c. DNS d. SND

_____12. A software that allows a user to locate, access, and display web pages.

a. HTML b. Search Engine c. Browser d. Utility

_____13. A massive collection of digital pages to access information over the internet.

a. HTML b. WWW c. HTTP d. URL

_____14. Who established the first Internet connection in Asia?

a. Kilnam Chon c. Breandan Kehoe
b. Jean Armour Polly d. Paul Baran

_____15. Which of the following is not part of an email address?

a. Domain Name b. Username c. @ sign d. URL

LESSON 4: PERSONAL AND SOCIAL BENEFITS OF INFORMATION TECHNOLOGY

"We need technology in every classroom and in every student and teacher's hand, because it is the pen and paper of our time, and it is the lens through which we experience much of our world."

– David Warlick

Learning Outcomes

At the end of the lesson, it is expected that students will be able to:

1. Analyze how the information age have impacted our lives and the society.
2. Increase their awareness on the pros and cons of information technology.
3. Discuss the factors that influence ineffective ICT.

Introduction

Technology has brought several advantages and disadvantages in our lives and how we interact with one another. Its impact might be good or bad in which these innovations have one goal in mind – to make our lives easier.

Lessons include:

- What is Information Technology?
- Benefits of Information Technology
- Advantages and Disadvantages of Living in the Era of Technology
- 12 Negative Effects of Technology in Education
- The Impact of Technology on Social Interactions
- Factors Influencing Against Effective ICT

PRE-TEST

Date: _____

Score: _____

TRUE OR FALSE. Analyze the statements below. Write T if the statement is correct and F if otherwise on the space provided before each number.

_____1. Teleconferencing is the application of computers and telecommunication equipment for automatic processing of information.

_____2. Youtube is an example of a social network.

_____3. The most important contributing factor to happiness is genuine relationship.

_____4. Technology helps in providing effective education to students.

_____5. The use of technology in the classroom provides quality education to students.

_____6. The widespread use of internet through numerous devices provide unlimited access to various entertainment platforms.

_____7. ICT is the result on the use of computer and information.

_____8. Technology helps enhance the teaching-learning process.

_____9. Smartphones and tablets are examples of digital tools.

_____10. Blended learning is the combination of face-to-face teaching and the use of textbooks.

_____11. Social networks is a means to share photos, videos, and other media.

_____12. Technology helps improve the retention rate of students.

_____13. An eBook is an electronic version of a traditional print book.

_____14. Emoticons are picture characters that represent a vast array of icons that extend beyond emotional expression.

_____15. Illiteracy is one of the factors that influence ineffective ICT.

Lesson 4

PERSONAL AND SOCIAL BENEFITS OF INFORMATION TECHNOLOGY

What is Information Technology?

Information Systems also known as Information Technology (IT) is the application of computers and telecommunication equipment for automatic processing of information. Information and Communication equipment (i.e Telephone, video etc. and other technologies associated with automation).

The use of computer + telecommunication equipment + information + technology = ICT.

Information and Communication Technology ICT refers to technologies that support communication via computer. It is worthy that a small version of the Net which is used within an office is called Intranet. Messages sent between buildings, using computers are called Local Area Network (LAN) and messages sent between cities are called Wide Area Network (WAN) while International Network simply put as Net is a global interconnected network.

In recent years, information and communication technologies created enviable channels/platforms in society with the majority of the impact seen on new communication capabilities. For example, people can communicate in real time without any inconvenience, also with others in different countries using technologies such as social networks that incorporate instant messages through ICQ, Yahoo, etc., voice over IP (VoIP) and videoconferencing. such as Instagram, Pinterest, LinkedIn Facebook allow users across the country, Europe, Asia and around the world to keep in touch and communicate with each other on a regular basis.

ICT is an umbrella term that includes all technologies for manipulation and communication of information. The term is sometimes used in preference to information technology. In the common usage, it is often assumed that ICT is synonymous with IT. It encompasses any medium to record disk/tape, CD/DVD, flash memory etc.

Benefits of Information Technology

1. Remote Accessibility. Advancements in information technology systems provide access to a company's or school's electronic network. You can now work from

home that somehow increases one's productivity and work keep coming in even when one is not physically present in the office which describes Mobility.

2. Creation of New Jobs. The rising demand of IT professionals creates new opportunities every day. Several emerging economies all over the world are now setting new records by strengthening their competence in this field. A greater number of people are showing interest in jobs like computer programming, system analysis, testing, software and hardware development and web application design, and other jobs.

3. Information Technology and Education. The application of information technology in education has significantly changed the traditional process of teaching and learning. Gone are the days of classrooms with blackboards. Today all educational institutions are imparting knowledge by using various modern gadgets especially in today's pandemic. Students with access to the internet have a whole world of research material at their disposal, which helps them grasp concepts efficiently and without wasting any time.

4. Information Technology and the Health Sector. The use of information technology has helped in improved patient care all over. Patients using the internet can now communicate with expert physicians from their home via virtual healthcare application systems. Also, tele-medicines, electronic health records and health grids have resulted in a greater impact on delivering efficient and quality health care to people across the globe.

6. Advancement of Economies. Since information technology has made businesses more efficient, the overall buying and selling activities are no longer restricted by time and distances. Companies from different parts of the world can now interconnect with each other conveniently. Today, every local as well as international has its presence online and caters to a much larger audience beyond its borders. E-commerce is the trend of today.

7. Communicating News. Wireless communication has revolutionized the ways in which we communicate news broadcast. And, whether it is latest updates from the Philippines, it is all being effectively communicated with the rest of the world. Today, it takes less than a few seconds for a new story to propagate from one part of the world to the other.

8. Entertainment. The widespread use of internet on laptops, smartphones, iPods, and other devices has given us unlimited access to various entertainment platforms. Gone are the days when people had to wait for the Friday night show or special telecast on the television. You can now download and purchase music, movies, TV shows and games easily and more conveniently.

9. Effective Communication. Information technology has definitely made communication cheaper, quicker and far more superior than ever before. Sending e-mails,

video calling/conferencing through Skype, Google Meet, Google Hangouts, Microsoft Teams, Webex, Zoom, and others, sending text messages through various online apps allows people sitting miles away to connect with each other. Businesses are reaping maximum benefit from this and employees distributed over a wide area can now remain connected through internal chat rooms or open source applications.

10. Globalization. Information technology has removed the physical barriers between nations and connected them through their shared ideas and opportunities. The advent of social media has made interactions easy and the use of Facebook, Twitter and all other social networking sites has drawn culturally different people to communicate with one another. People on the social media are now becoming 'global' citizens.

11. Accurate and Speedy Processing of Information. Whether it is government organizations, private business houses, institutions or even individuals, Information Technology has multiplied their abilities to process all sorts of information accurately at a faster speed. The use of spread sheets, database programs, word processors and many other tools help in ease of work without compromising on reliability.

Advantages and Disadvantages of Living in The Era of Technology

Without a doubt, we are currently living in the age of technology. With ever evolving technology at our fingertip's it is no surprise that every facet of our lives is now becoming dependent on increasingly complex devices. There is no question that such devices have enriched our lives making them infinitely easier, but too often we overlook the negative aspects of living in such a digital world.

Technology has both pros and cons, so teach students the netiquette for effective communication. They should use it for learning and not waste their time playing or looking for irrelevant things. Technology changes every minute, so the students and teachers need to keep themselves updated. However, traditional teaching methods are also equally important for the students.

Advantages

The benefits of technology are all around us and can be seen in everything from electricity to global communications. Our cars and cell phones have navigation systems to ensure that we do not get lost. We can pay our bills at the touch of a button on the internet. Our cellphones have evolved into tiny little computers in our pockets.

We can now communicate with anyone, anywhere in the world at any time not only by telephone, but also by video conference, instant messenger and email. With faster internet connections being introduced on a daily basis it seems like the only limit to what technology can do is our own imagination. All of these innovations have one goal in mind – to make our lives easier.

Let's look at a couple of examples. First, consider that you are the parent of a teenager. It's 7 pm and your 18-year-old daughter has not yet arrived home. What goes through your mind? Did she date someone? met an accident? Or still, have a class? Not able to take a ride? The possibilities are terrifying.

However, thanks to technology she has her mobile phone and you can give her a call (because your daughter will not think to call you first) and establish that she is perfectly fine, but missed the bus home and had to wait for the next one. Some parents might then think, 'wait, she could be lying! What if she is with her no-good boyfriend or what?' Technology has your back and you can use the GPS tracker or Global Positing System on the mobile phone monitoring app you installed on her phone and confirm that yes, she truly is at the bus stop or still in school. You could even check her text messages to confirm that she is doing fine.

Another scenario could be that you just left the classroom and are half way home when a classmate calls you that you have not submitted the group project which is due for the day. You would need to get off from the bus and head back to school, right? WRONG! Thanks to technology you can use your mobile device to log onto your cloud storage and send the file to your classmate to have it printed.

In Business

1. It makes information processing to be timelier with better surface area and even cheaper.
2. Access to information is now cheaper and economically viable
3. Effective and flexible Human interaction
4. ICT makes information dissemination more interactive and effective.
5. Globalization or global village: ICT has turned the whole world into a global village. Distance has become irrelevant in business transaction and dealings using e-mail and international World Wide Web.
6. Innovative ways of interaction and communication using GSM Technology, satellite cable network, video and teleconferencing, etc
7. It helps keep information reliable and up to date
8. It enables business and clients to communicate effectively
9. It allows more effective management of resources

Electronic Commerce. E-commerce is the act of buying and selling of goods and services over the net. Wealth creation and youth empowerment. ICT have created people who are empowered by their knowledge.

Teleconferencing. This is the use of computer and communication technology to conduct meeting whereby several participants in the different parts of the world are linked up. Computer and video system improved professional image.

In Education

1. Personalize the Education

Teachers find it helpful to have the technology and support in the classroom. The useful tools such as websites, apps, and e-books influence the students to study on their own. Digital materials support the students in discovering new things and learning the topics online on the internet. It is the ocean of resourceful information. Students can take advantage of completing their assignments in the classroom, and teachers can help them to sort the relevant information from the various resources.

2. Knowledgeable Information

The internet is the source for the ample amount of information beyond the textbooks. Today, even the kids are familiar with finding the answers to their queries or homework assignment on Google. The use of technology in the classroom, such as the internet, helps teachers to provide the students with a comprehensive view of any subject. On the other hand, it provides the opportunity for the teachers to give the right guidance to the students. In the classroom, technology helps teachers to teach students how to find quality information and remove the restricted information of the textbooks. This way, the students become sharper and receive a quality education.

3. Preference of the Students

Digital tools such as smartphones, the internet, computer, tablets are the preference of the students while studying. They used the same tools at home, so if they are provided those in the classroom too is a win-win situation. Laptops are particularly effective as the students can search the information about the given subject on the internet. They are also portal devices that ease communication.

Most of the students said that they learn new concepts through digital technology. They feel that their grades have been improved using digital tools in the classroom. Powerful digital learning can provide a customized solution for every student. It helps them to improve their academic performance. Hence, students prefer technology for understanding the concepts in depth and completing their assignments. They can even get the automated tool where they instruct “write an essay for me” and there is the ready essay for them.

4. The Readiness of Students at Workplace

One of the biggest benefits of technology in the classroom is the readiness of students in the workplace. Mobility is the growing trend in the workplace, and students who use technology in the classroom are adapted to using it in the workplace. Technology increases the digital literacy rate in the classroom. It promotes the use of cross-device proficiency, independent research, and improves soft skills such as critical thinking. Jobs

that may have not an advancement in technology in the past have it now. If the students are aware of technology and digital tools, then they can perform better in the workplace. This will help to increase efficiency and productivity when students go to their workplace. Education is just not solving complex problems but collaborating with the other workforce. Ed-tech prepares the students for technological advancement and setting them up for the digital economy.

5. Improve Retention Rate

Students believe that using technology can help them to retain the information in a better way. Students were challenged to complete the assignment about the animal in the PowerPoint presentation allowing internet access. According to the survey, it is found that the sixteen students out of eighteen remembered the facts about the presentation. This proves that technology helps to remember more information and learning by improving the retention rate.

6. Blended Learning Environment

The blended learning occurs when an education combines with the internet-based media with traditional textbook methods. It means replacing lectures and books with web-based technology. When technology meets with the traditional system of education, it delivers more purposeful learning by replacing the less effective pictures with more authentic video and visual learning. It provides students with a place, path, control over time, and the new pace of learning. Blended learning provides useful aspects of knowledge and a variety of approaches to achieve the goals set in life. It saves the time of teachers by automating the instruction through digital tools.

Blended learning provides unlimited access to free resources through e-textbooks. It also allows submitting the assignments online, cutting the costs of paper. It is not only effective in cost-cutting, but students also prefer to take the aid of the online materials. Teachers also get help through blended learning, and there is a change in their traditional mindset. They like to adopt it to provide problem-free digital tools to the students.

7. Teacher Support

Teachers play a vital role in the education of students. In the present scenario, it is tough for teachers to take care of every student. Classroom management means that there should be effective learning despite the disruptive behavior of students. Technology helps in providing effective education to the students, and the teacher can manage the classroom efficiently. The most important role of the teacher is to manage students that students should be regular in the class. Various apps manage the student’s attendance efficiently. Many apps help them to send the auto-generated real-time notifications to the parents and students, saving a lot of time and effort.

Various tools help the teachers in managing the students. Tasks become easier and effective through technology tools. They can provide the learning environment, both interesting and fun, to the students. The best thing is these tools save the time of teachers which they can use for the development of the students.

8. Increase Student's Engagement

Today's students are more tech-savvy and utilize them more likely as compared to the traditional methods of learning. Having technology alone can't improve the learning method, but the combination of technology and teacher can create a constructive classroom. It helps in global learning by having access to video conferencing and different language exposure to students from native speakers. Students having access to different multimedia result in the collaborative classroom. This allows the students to interact with each other and to increase the overall education experience. According to a survey, it has been found that 70 percent of the population are visual learners. The videos help provide in-depth learning to the students. It is not only educating but also entertaining to create the environment as fun learning.

Teachers should sometimes use podcasts to teach the students to break the monotony of the classroom. The repetitious reading assignments look dull, but podcasts make the learning more interesting. It makes the environment of the classroom alive and enabled the classroom discussion sessions. Classroom gaming is also one of the effective ways to keep the students engaged. There are tons of games that provide entertainment along with educating the students. They make the students eager to learn to have fun.

9. Utilize Digital Tools

Technology toys, whiteboards, tablets, learning apps, and websites are improving day by day. Even the ways students accessing the information are changing and improving with the growing age. Developers are becoming more conscious and making the apps that can provide the interacting sessions to the students to learn.

10. Social Media is a Powerful Tool

Social Media is also one of the effective tools that provide an opportunity to learn. There can be more interacting sessions, and students can engage with the ocean of knowledge available on the internet.

Instagram is a great way to capture the images for the science project. Twitter helps ask questions in the classroom. These can help to acquire information and real-world data. Students can make friends on Facebook, and this helps them to connect to the entire classroom for the literature project. Students can use Twitter and Google Earth to enhance their geographical knowledge.

Twitter can also be utilized to teach the students the probability. Before the classroom, you can send the question to your network so that when students come, they are ready for the answers and discussions. For instance, you can ask the students the probability of weather changes for the specific location.

Pinterest helps to perform the various projects that require visual elements. You can get a wide variety of images to pin, make a board, and share the ideas for the project on various topics

Disadvantages

It all sounds great, but there are still plenty of downsides. It seems like every other day the news is reporting cybercrimes as criminals begin to take advantage of our technology dependence. People have their credit card numbers stolen and businesses have their information hacked or computer systems disabled.

We are so dependent on technology that if for example, the bank's computer network failed, it is likely that most day-to-day operations would grind to a halt! While global communications are a great innovation, they are also a dangerous one as the internet affords everyone some degree of anonymity.

Let's go back to the example where you are parenting a teenage girl. What if that cinema date was actually her meeting up with someone she got talking to online? Someone she thought was 18 years old like her, but in reality, was a 50-year-old predator? Even although most parents try to teach kids about internet safety, teens believe that they are invincible and know best. 'It will never happen to me' is a phrase uttered by every teen at some point.

Although technology has created this dangerous situation, technology can also resolve it. If you have mobile phone spying software installed on her phone then you could have intercepted those plans to meet and put an end to it before anything bad happens.

So, is technology good or bad? The answer, quite simply is both! Technology is a great thing that makes our lives so much easier, but at the same time it must be treated with respect as it also has negative sides. It's kind of like a hammer. You can use the hammer to build things or to harm others.

In theory, technology is neutral. At the end of the day it's up to us to use it for good or evil.

Now, ICT also creates loss of jobs. While some people believe that computer is creating jobs, there are those who see the computer as creating unemployment. Another is invasion of individual privacy. Information about the individual on the internet is not totally secure that one begins to wonder whether a person has any right to his privacy any

longer. Next, Crime aid. The types of crimes that are committed with the computer are super crimes (e.g. Internet crimes and electronic fraud). Database manipulation. This is a sensitive area where frauds are perpetrated since. Since it consists most sensitive data of a particular organization (e.g. theft of storage media). Another is Computer fraud. This is the use of computer to perpetrate fraud. This fraudulent act is on a high scale especially in the financial sector.

12 Negative Effects of Technology in Education

In the present-day, human beings are living in a world where technology has already surpassed humanity. Technology is playing a very important role in every aspect of the lives of human beings.

There are many education experts who believe that technology has upgraded the system of education in the world, which is true to some extent, but there are many other people who thoroughly believe that this advancement of technology also has a bad effect on education.

The students are becoming highly dependent on the devices to complete their work rather than depending on their own knowledge and this is obviously a negative signal towards the growth of education and humanity in the modern world. There are many positive and negative effects of technology toward educational growth as follows:

1. Huge Expenditure

In the present day, students are not dependent on pen and paper. In this modern era of technology, computers and other devices have substituted the use of pen and paper.

These high-tech devices offer many advanced features to the user which is much more helpful than using pen and paper, but the maintenance of these devices costs a fortune to the owner. The maintenance requires a huge amount of money and the update of the outdated software also takes a fair amount of money. So, we can say that technology has made education expensive.

2. Insufficient Teaching Methods

With the advancement of technology, teachers are incapable of teaching students with modern techniques. The teachers know the primitive way of teaching the students by interacting with them. Research has proved that interactive teaching is the best way for students to learn.

With the use of technology and advanced devices, the interaction part is totally eliminated. The students only study the topics by themselves and do not discuss any topic. This has a bad impact on the students.

3. Waste of Time

Software and hardware devices are made by human beings, as humans can make errors, so the technology or devices made by human beings can also have some errors in it. These errors cause a loss of time. Problems like server issues and connectivity problems take a huge amount of time to get fixed, hence it disturbs the normal flow of teaching and causes frustration for both the teacher and the student.

Wasting time due to these kinds of unnecessary problems is not advisable in any educational institution or in schools where every second is important for the students.

4. Misguided due to Wrong Information

With speedy development and improvement in the technology, website owners are eager to rank their websites higher on different search engines. So, the owners are mostly concerned about ranking and are least concerned about the contents on the website.

This is the reason many websites contain wrong information on various topics that are pasted or copied from different sources without verifying the authenticity of the content. Due to this wrong information, the learners are often misguided which can severely harm their educational development.

5. Major Source of Distraction

Research has revealed that more than 60% of schools and colleges in the world are using modern devices like laptops and tablets as a means of teaching. So, the students are also using the same devices to be on par with the teachings of the teachers.

In the present day, social media has evolved leaps and bounds, with 90% of the world's population using social media. So, the devices which are provided to the students for studying are instead used to be active on social media.

Students are not studying with the help of these devices; they are interested in checking the posts and status updates of their near and dear ones and many other things. This is how technology is becoming a huge distraction for the learners, thus increasing the gap between students and educators.

6. Creates Enough Opportunities for Cheating

The advancement of technology is making the student lazy. It gives them the power and the opportunity to control everything with a few clicks of the mouse. Cheating is illegal, but technology has made it easy with all the resources contained in it.

There are many situations where the students can cheat very easily without getting caught, e.g. in an examination room, students can use their smartphones for cheating.

With the advancement of technology, smartphones are provided with many developed features and with internet accessibility so it becomes easy for the students to find the answers with the help of the internet.

7. Learners Get Disconnected from the Real World

In the present day, due to the huge advancement of technology, teachers are educating the students with different online tools instead of physically communicating with them, hence the students are unable to interact with the students and also cannot share problems with them.

Teachers miserably fail to draw the attention of the student. It is recommended to use verbal communication with the students along with using online tools. So, the students can learn the topics as well as they can share their problems with the teacher.

8. Losing Assignment of the Students

This is one of the major drawbacks of using devices like laptops and computers for educational purposes. Laptops and computers are devices made by human beings and these devices can malfunction due to internal or external causes.

In the present-day students tend to do all their assignments on their laptops or computers, even the schools and colleges also want this assignment as soft copies. E.g. a student completed his or her assignment with a lot of hard work and patience.

If the laptop of the student suddenly malfunctions at the last moment, then the student will be in great trouble. All the efforts and hard work will go in vain. So due to the malfunction of a device the entire effort of the student will become a waste.

It is advised to the students to always have a backup or a hardcopy of the required documents. So, we can say that these devices are not fully dependable.

9. Difficult to Deal with the Online Courses

It is said that knowledge has no age and no limit. There are many students who have an urge to continue learning on a regular basis, but sometimes it becomes very difficult for them to attain all the lecture classes on a regular basis.

These difficulties can occur due to many reasons; it can be health issues, family issues, or any other issues. Advancement of technology has solved this problem, and now students can learn the missed topic from the websites present on the internet and they can access those sites whenever and from wherever they want.

The solution is a bit faulty itself, the contents and the lecture videos on the Internet require good internet speed so it cannot be accessed smoothly if the internet is slow. These online lectures also fail to motivate the students compared to the physical lectures.

10. Extinction of Good Handwriting

Devices like laptops, desktops, tablets, and smartphones have already replaced the use of a normal pen and paper. Due to this, all the important assignments and documents are typed and saved into the respective folders, hence the writing down on paper is more or less eliminated.

Due to no writing or very little writing, people lose the habit to write, hence the handwriting becomes worse than it was before. Research has also revealed that using these machines instead of writing has slowed down the thinking process of the students and also brings a fair amount of lethargy in the students.

11. Partial to the Low-Income Group of People

Advancement in technology has also made education expensive. Advancement has given birth to different kind of modern devices which are very costly and also require a lot of money for maintenance.

This has made education difficult for people with less income; these people cannot afford this kind of education for themselves or for their children so it is partial for people with low income.

Every person in this world has the right to educate themselves, but the increase in cost has stolen this right, people with less income cannot afford this.

12. EBooks Replacing Physical Books

Ebooks are basically electronic books. Ebooks are the electronic versions of the normal books so these are easy to store and a person does not have to buy this book from the store, he or she can easily download it from the internet.

The problem is that these books are not compatible with all the devices and also constantly looking towards the screen of the laptop or a smartphone can cause eye problems to the user. So, it is recommended to the students to use normal books.

Even though technology has some negative effect on education, it is undeniable that it has made the education system simple and flexible. Students can take the help of the internet for their studies. The implementation of smart classes in every school and colleges is very good result of the technology because it eliminates all the educational limitations and boundaries faced by a learner. In addition, students can access their work and assignments with the help of these advanced devices whenever and from wherever they want. Through these observations, technology has greatly benefited the education system.

Advantages of Technology on Our Lives

The advent of technology has changed every single aspect of our lives as follows:

1. Ease of Access to Information

Information from all around the globe is widely available on the internet. EBooks are available on the internet for this purpose. The modern technology has replaced radios with televisions, and now even televisions have been digitized to “LCD’s” and “LED’s”.

2. Saves Time

Modern technology helps you navigate and search for a particular place and then even pinpoint their specific destination through the use of an application or app.

3. Ease of Mobility

Ever imagined your life without a car or a bike? Surely not because technology has placed these things under our foot. We have seen the importance of vehicle for instance from Kabankalan to CPSU. When riding a public vehicle, it takes 45 minutes to 1 hour to reach CPSU or vice versa but you can travel just in 25-30 minutes. Airplanes, electric trains and cars which are being improvised every single day have made all this possible.

4. Better Communication Means

It is a fact that modern technology has replaced old technology. And we cannot imagine our lives without this replacement. Letters were the most common means of communication less than a century ago, but now no one would even think of writing a letter because you can do it through chat, e-mail, or even video call.

Instant messaging and sharing of photos and videos were never so easy before. We have to accept that it's only the use of technology, which makes it harmful otherwise nothing can beat the level of comfort in our lives because of technology.

5. Cost Efficiency

One of the main goals of technology includes making things cheaper and more affordable for people. Therefore, people see cost efficiency these days due to technology. The machinery of great benefit is available for so less price that we cannot imagine. More often competition takes place between two or more industries which results in even lesser prices.

6. Innovation in Many Fields

Technology has truly resulted in digitization and modernization in many fields. Either it is the field of medicine or farming or electronics, technology has resulted in a global revolution. Better techniques in farming have resulted in more and healthier food. The technique of "layer farming" takes even less space and produces more food. The better health of animals guarantees more yield of dairy and poultry products. The health sector has also benefited a lot from technology boom. There are so many other fields also which cannot survive without the backbone of technology.

7. Improved Banking

Less than a decade ago no one ever thought that they would be paying in bitcoins rather than dollars. Cryptocurrency has recently got viral because of its usefulness. No one would now have to wait in the long line of banks to pay their bills or withdraw their money.

8. Better Learning Techniques

Technology has improved the teaching skills and integrate scientific methods to motivate students. The introduction of many software and electronic gadgets help students with their education. The simplest example is the conversion of binary to octal and hexadecimal, the answer comes with just a click.

9. Disable-d, Are Now Able-d

Modern science and technology have now made nearly everything possible. Recently, brails which works on electronic pulses have been invented. Artificial foot, smart sticks and what not is invented. Disabled are no more disabled. They are surely in the long run of success along with the normal ones.

10. Artificial Intelligence

The new concept of artificial intelligence is growing up fast, and it is gaining much popularity. The reason behind is that this might bring a whole new era of revolution. No humans would have to think anymore because the possibilities are that an AI System would be able to think about how to improve it. This would give a break to the human generation and probably one of the greatest favors of modern technology on us.

Advantages of New Technology in the Workplace

The technology developments are also helping to improve work environments and lifestyles of people in the workplace. Investments in technology leads to employee motivation, well-being, high productivity and growth for businesses that take the lead in its adoption.

1. Technology allows for working remotely, which has shown to increase employee productivity
2. Working remotely also offers more flexibility for parents and young mothers
3. Connecting with the best resources regardless of their location in the world
4. External and internal communication is quicker through emails, project management, co-working tools, and work place productivity apps
5. Helps save time, thanks to automation of redundant tasks
6. Leaves time for more innovation and growth-related conversations
7. Cost savings due to computing technology that takes care of the repetitive tasks
8. Less wastage of time because files are stored on the cloud and can be searched easily
9. Because of technology, companies can act faster, make quicker decisions, and remain adaptability
10. Less wastage and optimal usage of all other resources can be controlled
11. Monitoring of employee performance is made easier

Impact of Technology on Social Interactions

Humans are made to be in relationships. We have an innate longing to share our lives with family, friends, and partners. This social interaction is important but it is often complex. A person sends and receives information in many ways when they are

communicating with someone physically in front of them. For instance, a conversation is not just about the words, rather the message includes tone of voice, body language, facial expressions, context, and sometimes physical touch. While face-to-face interaction is the most genuine form of social interaction, technology has enabled people to socially interact without physically being in the same place.

Now we can communicate with one another through websites and apps like Facebook and Snapchat. Ironically, technologically based social interaction becomes more popular as it adds features that mimic face-to-face interaction. For instance, the introduction of emojis in texting and on Facebook has given us the ability to show a facial expression and even indicate physical touch. They are popular because we feel we are able to better express ourselves but the actual expressions are still artificial. Snapchat is also popular because it does not have the same permanency as Facebook. Snapchat incorporates emojis, texts, pictures, and videos so we can not only show our surroundings but also use our own tone of voice and facial expressions. However, these methods of connecting are limited because they do not incorporate all aspects of face-to-face interaction.

Social technology is valuable because we are able to stay connected with friends and family who are further away but it is beginning to replace face-to-face interaction. It may not be a conscious decision, but more and more people are relying on technology for social interaction rather than interacting with others in person. Additionally, people have become so vested in how they are portrayed online that they often will only put flattering pictures and stories on social media. The combination of spending less time interacting in person and having superficial interaction online is making us feel isolated.

In a recent Ted Talk, psychiatrist Robert Waldinger discussed the findings of a 75-year study on adult development conducted by researchers at Harvard University. They found that the one most important contributing factor to happiness was healthy, genuine relationships. Those who were more socially connected were happier and healthier whereas those who were more isolated were less happy and lived shorter lives. As mentioned before, social interactions through technology tend to be superficial, isolating and less genuine than face-to-face interactions. Social technology can actually be detrimental to our well-being and overall happiness.

If the current trend continues over the next 10 years, we will grow increasingly more reliant on technology for social interaction and the amount of time spent physically with other people will reduce. This trend will cause us to have significantly less genuine social connections and we will ultimately feel more isolated. In the new reality we will prefer to brag about our lives online in order to gain affirmation from our followers instead of sharing a funny moment around a dinner table. We will grow accustomed to seeing a cartoon face on our phones instead of a candid expression but ultimately technology will never be able to bring us happiness in the same way as face-to-face interaction.

Factors Influencing Against Effective ICT

According to techtarget.com, Digital Divide is a term that refers to the gap between demographics and regions that have access to modern information and communications technology, and those that don't or have restricted access. This technology can include the telephone, television, personal computers and the Internet.

Hereunder are the factors that influence against effective ICT:

1) Illiteracy
2) Poverty
3) Virus Attack
4) Insecurity
5) Interrupt

Activities

ACTIVITY #1

Date: _____

Score: _____

Is technology important to you? What is your Tech personality? How many hours do you spend on the internet? Does it play a great role in your life? In what aspect/s? Consider the following: Education, Social, Moral, and Spiritual.

ACTIVITY #2

Date: _____

Score: _____

Cite a situation in your life where you experienced the negative effect/s of technology. Present your answer through a comic strip or comic presentation. Use the space below.

ACTIVITY #3

Date: _____

Score: _____

What is/are the contribution/s of technology in today's pandemic?

ACTIVITY #4

Date: _____

Score: _____

Conduct an interview with elders of at least 2 (within your home) on “Technology and Past”. Write the results of your interview. Compare and contrast their life before (without technology) and today (with technology).

POST-TEST

Date: _____

Score: _____

TRUE OR FALSE. Read and analyze the statements below. Write T if the statement is true and F if false, on the space provided before the number.

_____1. Illiteracy is one of the factors that influence ineffective ICT.

_____2. ICT is the result on the use of computer and information.

_____3. Teleconferencing is the application of computers and telecommunication equipment for automatic processing of information.

_____4. Emoticons are picture characters that represent a vast array of icons that extend beyond emotional expression.

_____5. Youtube is an example of a social network.

_____6. Technology helps improve the retention rate of students.

_____7. The most important contributing factor to happiness is genuine relationship.

_____8. Social networks is a means to share photos, videos, and other media.

_____9. Technology helps in providing effective education to students.

_____10. Smartphones and tablets are examples of digital tools.

_____11. The use of technology in the classroom provides quality education to students.

_____12. The widespread use of internet through numerous devices provide unlimited access to various entertainment platforms.

_____13. Technology helps enhance the teaching-learning process.

_____14. Blended learning is the combination of face-to-face teaching and the use of textbooks.

_____15. An eBook is an electronic version of a traditional print book.

LESSON 5: UNDERSTANDING THE IMPACT OF TECHNOLOGIES

"Who knows what technology will emerge in the next five years, let alone 20. Yet the education we provide our children now is supposed to last for decades. We cannot train them for jobs that do not even exist yet, but we can provide them for jobs that do not even exist yet, but we can provide them with the minds and tools they'll need to adapt to our ever-changing set of circumstances.".

- *Jim Hunt*

Learning Outcomes

At the end of the lesson students are expected to:

1. Understand the meaning of emerging technology.
2. Discuss the five attributes of emerging technology.
3. Analyze the impact of disruptive technologies that might improve or harm our lives, the country's economy, our government, and the world.
4. Discuss the ethics and morality of technology.

Introduction

Humans innovate because of their creative ability. Emerging technologies will transform the world in many ways – some are desirable, and others are not that results in what is known as digital transformation or technological change.

Lessons include:

- Definition of Emerging Technology
- Five Attributes of Emerging Technology
- Disruptive Technologies: Advances that will Transform Life, Business and the Global Economy
- Emerging Technologies:Ethics and Morality
- Ethics and Morality of Technology

PRE-TEST

Date: _____

Score: _____

TRUE OR FALSE. Read and **a**nalyze each statement. Write TRUE if the statement is correct and FALSE if otherwise on the space provided before the number.

_____1. Emerging technologies is always advantageous.
_____ 2. Disruptive technology depends on mechanical improvements to an established technology.
_____ 3. Emerging technologies does not decide the future of humanity.
_____ 4. Technology is incapable of having any moral or ethical qualities.
_____ 5. Artificial intelligence or robotics has negative social effect.
_____ 6. A technology gains popularity for its prominent impact or promised profound effect on specific domains.
_____ 7. Emerging technologies have the potential to change existing ways of doing things.
_____8. Disruptive technologies can change the world.
_____ 9. Renewable electricity-solar and wind is an example of disruptive technology.

_____10. Some technologies have disruptive impact.

_____11. A technology never gains popularity for its prominent impact or promised profound effect on specific domains

_____12. Emerging technologies are innovative technologies that have been recently developed, are under development or will still be developed.

_____13. Clayton M. Christensen invented the term “Disruptive technology”.

_____14. The emergence of Digital Media Store such as iTunes has led to the decline in the sales of physical press album such as CD.

_____15. Optimists believe that emerging technologies, if properly used, could eliminate poverty and abolish suffering.

_____16. Pope Francis asserts that “...science and technology are wonderful products of a God-given creativity.”

_____17. The existence of internet has prompted the birth of a lot of other technologies.

_____18. Emerging technologies are innovative technologies.

_____19. Determination of access to the benefits of technological change is called Distributive Justice.

_____20. Professor Shimon Whiteson believed that there is no fundamental difference between human and machines and that “somewhere down the line some computers will be more intelligent than most people.”

Lesson 5

Understanding the Impact of Technologies

The relentless parade of new technologies is unfolding on many fronts. Almost every advance is billed as a breakthrough, and the list of “next big things” grows ever longer. Not every emerging technology will alter the business or social landscape—but some truly do have the potential to disrupt the status quo, alter the way people live and work, and rearrange value pools. It is therefore critical that business and policy leaders understand which technologies will matter to them and prepare accordingly.

Defining Emerging Technology

Rotolo et al (2015) defined Emerging Technology as a radically novel and relatively fast growing technology characterized by a certain degree of coherence persisting over time and with the potential to exert a considerable impact on the socio-economic domain(s) which is observed in terms of the composition of actors, institutions and patterns of interactions among those, along with the associated knowledge production processes Its most prominent impact, however, lies in the future and so in the emergence phase is still somewhat uncertain and ambiguous.

Five Important Attributes of Emerging Technologies

1. Radical novelty points to a technology’s ability to be “revolutionary” in terms of achieving a new or changed purpose or function (e.g., cars with an internal combustion engine versus an electric engine) and to be “evolutionary” in terms of putting existing technologies to new use (e.g., technology for measuring electromagnetic waves used now for wireless communication technology and data transmission).

2. Relatively fast growth is observed in a number of dimensions pertaining to an emerging technology, such as: (a) diversity of interested stakeholders (e.g., scientists, universities, firms, users); (b) public and/or private funding; (c) knowledge outputs or the number of documents on a particular technology produced over time (e.g., publications, patents); or (d) other indicators of growth, such as number of prototypes, products released or services rendered.

3. There is coherence in the presence of an expert community of practice that adopts and iterates the concepts or constructs underlying a particular emerging technology.

4. A technology gains popularity for its prominent impact or promised profound effect on specific domains (e.g., diagnostic technologies for a particular disease) or wide-ranging impact across different domains and potentially the entire socio-economic system (e.g., molecular biology, ICT).

5. Finally, an emerging technology is usually shrouded with uncertainty. The prominent impact of emerging technologies lies somewhere in the future suggesting that it is not yet finished. Emerging technologies have the potential to change existing ways of doing things. However, the application of the technology is still malleable and fluid. The knowledge of possible outcomes is incomplete, which include unintended consequences.

Emerging technologies are innovative technologies that have been recently developed, are under development or will be developed within the next few years. Disruptive technologies, however, are innovations that drastically change the way organizations and industries function (infogoto.com). Disruption can have two meanings: 1) to throw into turmoil or disorder; 2) to break or split apart (architecture andgovernance.com/).

Some emerging technologies hold the promise of being “disruptive innovations,” an idea introduced by Bower and Christensen (1995) to describe “new technologies that undermine and eventually displace established products, firms, or even entire industries. Thus, by its nature, disruptive innovation challenges regulators (Cortez, 2014).

Disruptive technologies: Advances that will transform life, business, and the global economy, a report from the McKinsey Global Institute, cuts through the noise and identifies 12 technologies that could drive truly massive economic transformations and disruptions in the coming years. The report also looks at exactly how these technologies could change our world, as well as their benefits and challenges, and offers guidelines to help leaders from businesses and other institutions respond.

We estimate that, together, applications of the 12 technologies discussed in the report could have a potential economic impact between $14 trillion and $33 trillion a year in 2025. This estimate is neither predictive nor comprehensive. It is based on an in-depth analysis of key potential applications and the value they could create in a number of ways, including the consumer surplus that arises from better products, lower prices, a cleaner environment, and better health.

Some technologies detailed in the report have been gestating for years and thus will be familiar. Others are more surprising. Examples of the 12 disruptive technologies include:

Advanced robotics—that is, increasingly capable robots or robotic tools, with enhanced "senses," dexterity, and intelligence—can take on tasks once thought too delicate or uneconomical to automate. These technologies can also generate significant societal benefits, including robotic surgical systems that make procedures less invasive, as well as robotic prosthetics and "exoskeletons" that restore functions of amputees and the elderly.

Next-generation genomics marries the science used for imaging nucleotide base pairs (the units that make up DNA) with rapidly advancing computational and analytic

capabilities. As our understanding of the genomic makeup of humans increases, so does the ability to manipulate genes and improve health diagnostics and treatments. Next-generation genomics will offer similar advances in our understanding of plants and animals, potentially creating opportunities to improve the performance of agriculture and to create high-value substances—for instance, ethanol and biodiesel—from ordinary organisms, such as E. coli bacteria.

Energy-storage devices or physical systems store energy for later use. These technologies, such as lithium-ion batteries and fuel cells, already power electric and hybrid vehicles, along with billions of portable consumer electronics. Over the coming decade, advancing energy-storage technology could make electric vehicles cost competitive, bring electricity to remote areas of developing countries, and improve the efficiency of the utility grid.

The potential benefits of the technologies discussed in the report are tremendous—but so are the challenges of preparing for their impact. If business and government leaders wait until these technologies are exerting their full influence on the economy, it will be too late to capture the benefits or react to the consequences. While the appropriate responses will vary by stakeholder and technology, we find that certain guiding principles can help businesses and governments as they plan for the effects of disruptive technologies.

Business leaders should keep their organizational strategies updated in the face of continually evolving technologies, ensure that their organizations continue to look ahead, and use technologies to improve internal performance. Disruptive technologies can change the game for businesses, creating entirely new products and services, as well as shifting pools of value between producers or from producers to consumers. Organizations will often need to use business-model innovations to capture some of that value. Leaders need to plan for a range of scenarios, abandoning assumptions about where competition and risk could come from, and not be afraid to look beyond long-established models. Organizations will also need to keep their employees' skills up-to-date and balance the potential benefits of emerging technologies with the risks they sometimes pose.

Policy makers can use advanced technology to address their own operational challenges (for example, by deploying the Internet of Things to improve infrastructure management). The nature of work will continue to change, and that will require strong education and retraining programs. To address challenges that the new technologies themselves will bring, policy makers can use some of those very technologies—for example, by creating new educational and training systems with the mobile Internet, which can also help address an ever-increasing productivity imperative to deliver public services more efficiently and effectively. To develop a more nuanced and useful view of technology’s impact, governments may also want to consider new metrics that capture more than GDP effects. This approach can help policy makers balance the need to

encourage growth with their responsibility to look out for the public welfare as new technologies reshape economies and lives.

Disruptive Technologies

Disruptive technology such as artificial intelligence, machine learning, and the internet of things offer a great deal of promises. It provides digital transformation for the business processes and to a particular organization as a whole.

According to techmediatoday.com, Disruptive technology is defined as an innovation that alters way effectively that industries, consumers, and businesses operate. It alters a founded technology and agitates the industry or a ground-breaking product, that makes an entirely new industry. This technology sweeps away the habits or systems because it has attributes that are recognizably superior.

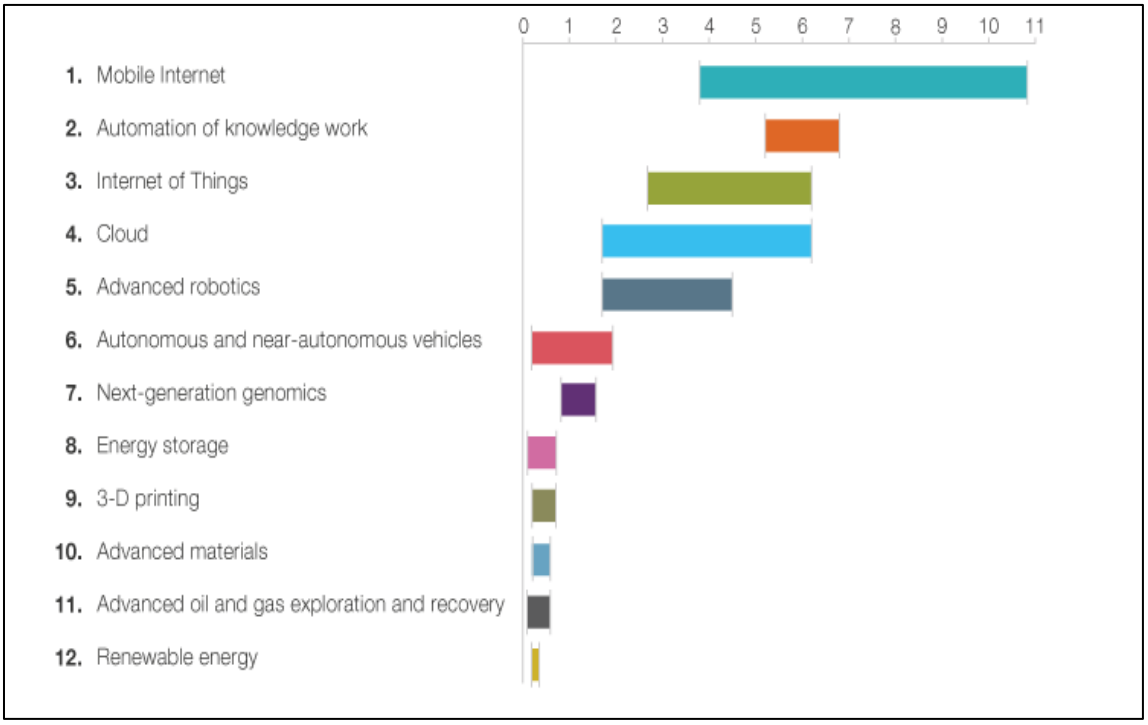
Clayton M. Christensen, the professor of Harvard Business School, invented the term ‘Disruptive technology’. In the book named ‘The Innovator’s Dilemma’, written by Christensen, separated the new technology into two parts. One was sustaining technology, and the other is a disruptive technology.

Sustaining technology depends on mechanical improvements to an established technology. Disruptive technology often goes through performance issues as it is new, and it appeals to a limited audience, and it may not have a proven practical application.

In the book named ‘The Innovator’s Dilemma’, Christensen pointed out that huge corporations are designed to work with sustaining technologies. These corporations excel at knowing their market by making a close connection to the customers and by having a mechanism in place for developing the existing technology.

Moreover, they faced problems due to capitalizing on the potential efficiencies, cost-savings, and new marketing opportunities that were created by low-margin disruptive technologies. By applying real-world examples for illustrating his viewpoint, Christensen demonstrated how it is not unnatural for a huge corporation to dismiss the value of disruptive technology.

Estimated potential economic impact of technologies across sized applications in 2025

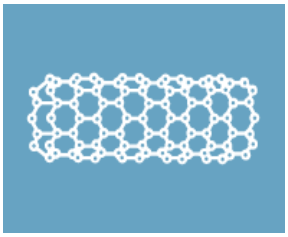


SOURCE: McKinsey Global Institute

Technologies	Description	Component Technologies	Key Applications
1. Mobile Internet 	Increasingly inexpensive and capable mobile computing devices and internet connectivity *(10-20% potential cost reduction in treatment of chronic diseases through remote health monitoring)*	• Wireless technologies • Small, low-cost computing and storage devices • Advanced display technology, natural user interfaces • Advanced, low-cost batteries	• Service delivery • Worker productivity • Additional consumer surplus from use of mobile-internet services
2. Automation of Knowledge Work 	Intelligent software systems that can perform knowledge-work tasks (*Additional labor productivity could equal the output of 110-140M full-time workers)*	• Artificial intelligence, machine learning • Natural user interfaces • Big-data technologies	• Smart learning in education • Diagnostics and drug discovery in health care • Discovery, contracts/paten

			ts in legal sector • Investments and accounting in finance sector
3. Internet Of Things 	Networks of low-cost sensors and actuators for data collection, monitoring, decision making, and process optimization *(Offers potential to drive productivity across 36 trillion dollars in operating costs of key affected industries: manufacturing, health care, and mining)*	• Advanced, low-cost sensors • Wireless and near-field communication devices e.g. RFID (Radio Frequency Identification Tags)	• Process optimization, especially in manufacturing and logistics • Efficient use of natural resources – e.g. Smart-meter and smart-grid control of water and electricity • Remote health-care delivery, sensor-enhanced business models
4. Cloud 	Use of computer hardware and software resources to deliver services over the Internet or a Network *(15-20% productivity gains across IT infrastructure, application development, and packaged software)*	• Cloud management software e.g. Virtualization, metering • Data-center hardware • High speed networks • Software/Platform as a service	• Cloud-based deliver of internet services and applications • Enterprise IT productivity
5. Advanced Robotics 	Increasingly capable robots with enhanced sensors, dexterity, and intelligence; used to automate many tasks *(Offers potential to improve the lives of 50 million amputees*	• Artificial intelligence/computer vision • Advanced robotic dexterity, sensors • Distributed robotics • Robotic exoskeletons	• Industrial/manufacturing robotics • Service robots e.g. food preparation, cleaning and maintenance • Robotic surgery

	and those with impaired mobility)		• Human augmentation • Personal and home robots e.g. for cleaning, lawn care
6. Autonomous or Near-Automous Vehicle 	Vehicles that can navigate and operate autonomously or semi-autonomously in many situations *(could save 30,000-150,000 lives from potentially fatal traffic accidents)*	• Artificial intelligence, computer vision • Advanced sensors e.g. Radar, lidar, GPS • Machine-to-machine communication	• Self-driving cars and trucks
7. Next Generation Genomics 	Fast, Low-cost gene sequencing, advanced analytics, and synthetic biology (e.g. writing DNA) *(Extending and enhancing lives accounts for 75% of potential impact – eg. Through faster disease detection, new drugs)*	• Advanced DNA-sequencing technologies • DNA-synthesis technologies • Big data and advanced analytics	• Disease treatment • Agriculture • Production of high-value substances
8. Energy Storage 	Devices or physical systems that store energy for later use *(40-100% of new vehicles sold in 2025 could be electric or hybrid)*	• Battery technologies e.g. Lithium-ion and fuel cells • Mechanical technologies e.g. Pumped hydro and pressurized gas • Advanced minerals, nanomaterials	• Electric and hybrid vehicles • Distributed energy including off-grid • Utility-scale grid storage
9. 3-D Printing	Additive-manufacturing techniques that create objects by	• Selective laser sintering (SLS) • Fused deposition modeling (FDM)	• Consumer use of 3-D printers • Direct product manufacturing

	printing successive layers of material using digital models. *(Consumers use of 3-D printing could save them 35-60% in costs per printed product, while enabling a high level of customization)*	• Stereolithography (SLA) • Direct metal laser sintering (DMLS)	• Bioprinting of tissue and organs
10. Advanced Materials 	Materials that have superior characteristics such as better strength and conductivity or enhanced functionality such as memory or self-healing capabilities. *(Nanomedicine could be used to deliver targeted drugs to 20M new cancer cases worldwide in 2025)*	• Graphene • Carbon nanotubes • Nanoparticles eg. Nanoscale gold and silver • Other advanced and smart materials eg. Piezoelectric materials, memory metals, self-healing materials	• Nanoelectronics, displays • Nanomedicine, sensors, catalysts, advanced composites • Energy storage, solar cells • Enhanced chemicals and catalysts
11. Advanced Oil and Gas Exploration and Recovery 	Advancements in exploration and recovery techniques that make extraction of additional oil and gas economical *(Offers potential to supply an additional 3-.6-6.2B oil-equivalent barrels of oil and gas annually by 2025)*	• Horizontal drilling • Hydraulic fracturing (“fracking”) • Micro seismic monitoring	• Energy from fuel extraction; includes shale gas, light tight oil, and coal-based methane • Coalbed methane and methane clathrate
12. Renewable Electricity-Solar and Wind 	Generation of electricity from renewable sources with reduced harmful climate impact *(Potential to avoid emissions of 1,000-1,200M tons of CO_2 annually by 2025)*	• Photovoltaic cells • Wind turbines • Concentrated solar power • Hydroelectric and ocean-wave power • Geothermal energy	• Electricity generation • Reduction in CO_2 emissions • Distributed generation

Technology with Disruptive Impact

Technology	Disruptive Impact
Digital Media Store	Before 2003, most of the consumers buy their favorite music in the form of the Compact Disc (CD). With the emergence of Digital Media Store such as iTunes, led to the decline in the sales of physical press album such as CD and Long Play Vinyl (LP). In addition, continuous declination led to the demise of cassette tapes.
Streaming Video Portal	With the emergency of streaming video portal such as Netflix, people started to watch video online. This subsequently led to the declination in TV Cable and DVD sales.
Smartphones	Smartphones start to be used extensively since 2013. Since then, many products were created solely due to its existence such as Instagram, Snapchat, WhatsApp and others. These products did not exist several years backward.
Internet	The existence of internet prompted the birth of a lot of other technologies such as email, social media, smartphones as well as file sharing among others.

Emerging Technologies: Ethics and Morality

Anyone who believes that they will still lead an active life in the next ten years should try to understand emerging technologies because these will radically change the world from what it is today. These new technologies will have an impact on all aspects – political, economic and even cultural – of society. Everyone's daily life – rich or poor, educated or uneducated, urban or rural – will experience radical transformation. Changes that used to take decades to happen will materialize in a matter of years.

These emerging technologies will decide the future of humanity because they can be used by the elite class or populists for good or evil. There is no doubt that there will be immense benefits from these new forms of technology. The main issue has been termed as "distributive justice" by some thinkers. This refers to the determination of access to the benefits of technological change.

There are those who believe that the benefits of emerging technologies will worsen the plight of the poor. The World Bank and the International Labor Organization have already warned that millions of jobs will be wiped out by new technologies. As new labor devices are invented, the power of capitalists will grow and the power of labor will diminish. The number of billionaires will increase while the gap between the rich and the poor will

continue to widen. Stephen Hawking, the world's most famous scientist, has even said that artificial intelligence could lead to the extinction of humanity.

By contrast, the optimists believe that emerging technologies, if properly used, could eliminate poverty and abolish suffering. Stuart Russell of UC Berkley said: "Everything we have of value as human beings, as civilization is the result of intelligence and what artificial intelligence (AI) could do is essentially be a power tool that magnifies human intelligence and gives us the ability to move our civilization forward in all kinds of ways. It might be curing disease; it might be eliminating poverty. I think it certainly should be preventing environmental catastrophe. AI could be instrumental to all those things.

The World Economic Forum has said that the emerging technologies will transform the world in many ways – some are desirable and others are not. Too often the debates about emerging technologies take place at the extremes of possible consequences. There are those who focus on the potential gains and others who focus on the potential dangers. The challenge is looking for the best middle ground between the two extremes.

Ultimately, the extent to which the benefits of emerging technologies will be maximized will depend on the quality of governance. This whole issue becomes a debate on the ethics of governance of these new technologies.

Professor Shimon Whiteson of the University of Amsterdam gives a graphic example: "...I think the human and the computer are really, really quickly becoming one tightly coupled cognitive unit. Imagine how much productive we would be if we could augment our brains with infallible memories and infallible calculators.

Society is already dealing with the difficult questions about privacy and security that have been raised by the internet. Imagine when the internet is in your brain, if the NSA can see in your brain, if hackers can hack into your brain.

Imagine if skills can be downloaded – what's going to happen when we have this kind of artificial intelligence (AI) but only the rich can afford to become cyborgs, what's that going to do to society?"

These ethical issues have given rise to even controversial declarations. Marvin Minsky was a cognitive scientist and faculty member of the Massachusetts Institute of Technology. He won several scientific awards and was an atheist. He believed that there is no fundamental difference between human and machines and that "somewhere down the line some computers will be more intelligent than most people."

Ethics and Morality of Technology

Technology itself is incapable of having any moral or ethical qualities since it is just a tool. There are, however, two basic moral or ethical issues. The first is whether it is right or wrong to invent or implement a technological innovation. Is it morally right to clone a human being?

The second issue focuses on the ethical use of technology in order to protect society from the misuse of technology. The role of government is to formulate laws and regulations that will serve to ensure that new advances in technological development and application will benefit society.

The World Economic Forum has identified two technologies that stand out as requiring immediate attention for better governance. The first is artificial intelligence or robotics which could have negative social effects such as loss of jobs, invasion of privacy and misuse of data by interest groups or even governments. The second are biotechnologies that involve the modification of living organisms for medicinal, agricultural or industrial uses.

Pope Francis has expressed very strong views on the morality of technology. In his encyclical *Laudato Si*, he asserts that "...science and technology are wonderful products of a God-given creativity." But he also warned of economic interests who "...accept every advance in technology with a view to profit, without concern for its potentially negative impact on human beings.

Perhaps, it may sound simplistic but our business and government leaders should heed the words of Pope Francis when he affirmed that technology can and should be used to improve the lot of humanity and in service to the common good.

Activities

ACTIVITY #1

Date: _____

Score: _____

Do you think there will be more technologies to emerge aside from those being discussed? What would it be? and discuss.

ACTIVITY #2

Date: _____

Score: _____

Enumerate at least 3 emerging technologies aside from those mentioned in the lesson. Give its description and impact.

POST-TEST

Date: _____

Score: _____

TRUE OR FALSE. Read and **a**nalyze each statement. Write TRUE if the statement is correct and FALSE if otherwise on the space provided before the number.

_____1. Disruptive technologies can change the world.
_____2. Emerging technologies is always advantageous.
_____3. There are technologies with disruptive impact.
_____4. A technology gains popularity for its prominent impact or promised profound effect on specific domains.
_____5. Disruptive technology depends on mechanical improvements to an established technology.
_____ 6. Emerging technologies does not decide the future of humanity.
_____ 7. Renewable electricity-solar and wind is an example of disruptive technology.
_____ 8. Artificial intelligence or robotics has negative social effect.
_____ 9. Emerging technologies have the potential to change existing ways of doing things.
_____ 10. Technology is incapable of having any moral or ethical qualities.
_____ 11. The existence of internet has prompted the birth of a lot of other technologies.
_____ 12. The emergence of Digital Media Store such as iTunes has led to the decline in the sales of physical press album such as CD.
_____ 13. A technology never gains popularity for its prominent impact or promised profound effect on specific domains
_____ 14. Determination of access to the benefits of technological change is called Distributive Justice.
_____15. Emerging technologies are innovative technologies that have been recently developed, are under development or will still be developed.
_____16. Professor Shimon Whiteson believed that there is no fundamental difference between human and machines and that “somewhere down the line some computers will be more intelligent than most people.”
_____17. Pope Francis asserts that “...science and technology are wonderful products of a God-given creativity.”
_____18. Clayton M. Christensen invented the term “Disruptive technology”.

_____19. Optimists believe that emerging technologies, if properly used, could eliminate poverty and abolish suffering.

_____20. Emerging technologies are innovative technologies.

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