* 1. Computer literacy

Computer literacy can be defined from two vantage points, each of which is informed by a dynamic mixture of skills that are needed to access and manipulate digitally encoded information. For an individual, it simply means being able to use the computer as a means to an end. A person who uses a vehicle to get from point a to point b must know how to drive, have a basic understanding of the need for automobile maintenance (such as having the oil changed), and demonstrate knowledge of the rules of the road. That person does not need any in-depth knowledge of how a car functions. In a similar fashion, attaining competence in using computers to perform personal or vocational tasks is the most rudimentary form of computer literacy. It is not essential that computer users know how the machine does what it does, although such knowledge might provide motivation for more sophisticated or increasingly efficient use or serve as a foundation for understanding how computers function in the social order. Hence, computer literacy can also be defined as one element of information literacy and as a collective concept that includes a grasp of the economic, social, and political consequences of widespread computer use.

Computers receive information as input by human beings. They then store, process, retrieve, and provide results in the form of displayed or printed output. All computer operations transpire in accordance with instructions that are written by human beings. At the most basic level, computer literacy means having the aptitude to manipulate these sets of instructions—rendered as programs or applications—to tell computers to process digital data in ways that serve human ends. Mastery of a word-processing program affords one the ability to create, edit, format, display, or print a document in record time. Computer literacy enables a person to exploit the computer's capacity for calculation and representation through use of spreadsheet and database applications. Computer literacy is critical for easy and immediate sorting, management, and association of a mixture of information that can be used for financial or inventory purposes. In their role as communication tools, computers serve to transfer information through programs that shift information from computer to computer, allowing it to be displayed as text or in graphic form. The concept can also include knowing how to connect to storehouses of information to satisfy curiosity or be entertained.

A person who is computer literate should be able to use computers to perform a few tasks such as writing letters or reports, calculating and comparing numbers or objects, or communicating via connections that support e-mail or (perhaps) a web-page, as personal, business, or educational circumstances require. A modest definition of individual computer literacy turns, therefore, on knowing how to use computers to personal advantage. It means using computers to do what they do best—storing, accessing, and repetitively and rapidly processing massive quantities of data for human interpretation, which adds value that turns data into information. The definition might include knowing how to connect to storehouses of information to satisfy curiosity or be entertained.

Computer literacy is not corroborated through a tidy checklist that enumerates how many and which functions an individual can complete using the tool. It occurs in the intersection of knowing how to do or find what one needs or wants in a particular place, at a particular time, for particular reasons. Similar to the driver's understanding of the need for basic car maintenance, a rudimentary definition of computer literacy would also include awareness of the basic elements of, and forces associated with, this machine. The coincidence of computer use and connectivity have brought about a changed atmosphere wherein users, regardless of their level of know-how, are aware that terms such as "hardware," "byte," "monitor," "modem," "bandwidth," "virus," and "protocol" have distinct meanings. Even if a user does not fully understand all of the vocabulary that comes with computer use, these words permeate public consciousness and emphasize a presumed need for computer literacy. Fundamental understanding of computer capabilities and configuration in networks suggests an expanded definition of computer literacy that recognizes the effect that computers have had on society. The notion of computer literacy thus grows to include access to means of improving one's computer skills through education or additional experience.

* 1. The First Computers

The first substantial computer was the giant ENIAC machine by John W. Mauchly and J. Presper Eckert at the University of Pennsylvania. ENIAC (Electrical Numerical Integrator and Calculator) used a word of 10 decimal digits instead of binary ones like previous automated calculators/computers. ENIAC was also the first machine to use more than 2,000 vacuum tubes, using nearly 18,000 vacuum tubes. Storage of all those vacuum tubes and the machinery required to keep the cool took up over 167 square meters (1800 square feet) of floor space. Nonetheless, it had punched-card input and output and arithmetically had 1 multiplier, 1 divider-square rooter, and 20 adders employing decimal "ring counters," which served as adders and also as quick-access (0.0002 seconds) read-write register storage.

The executable instructions composing a program were embodied in the separate units of ENIAC, which were plugged together to form a route through the machine for the flow of computations. These connections had to be redone for each different problem, together with presetting function tables and switches. This "wire-your-own" instruction technique was inconvenient, and only with some license could ENIAC be considered programmable; it was, however, efficient in handling the particular programs for which it had been designed. ENIAC is generally acknowledged to be the first successful high-speed electronic digital computer (EDC) and was productively used from 1946 to 1955. A controversy developed in 1971, however, over the patentability of ENIAC's basic digital concepts, the claim being made that another U.S. physicist, John V. Atanasoff, had already used the same ideas in a simpler vacuum-tube device he built in the 1930s while at Iowa State College. In 1973, the court found in favor of the company using Atanasoff claim and Atanasoff received the acclaim he rightly deserved.

In the 1950's two devices would be invented that would improve the computer field and set in motion the beginning of the computer revolution. The first of these two devices was the transistor. Invented in 1947 by William Shockley, John Bardeen, and Walter Brattain of Bell Labs, the transistor was fated to oust the days of vacuum tubes in computers, radios, and other electronics.

The vacuum tube, used up to this time in almost all the computers and calculating machines, had been invented by American physicist Lee De Forest in 1906.

The vacuum tube, which is about the size of a human thumb, worked by using large amounts of electricity to heat a filament inside the tube until it was cherry red. One result of heating this filament up was the release of electrons into the tube, which could be controlled by other elements within the tube. De Forest's original device was a triode, which could control the flow of electrons to a positively charged plate inside the tube. A zero could then be represented by the absence of an electron current to the plate; the presence of a small but detectable current to the plate represented a one.

Vacuum tubes were highly inefficient, required a great deal of space, and needed to be replaced often. Computers of the 1940s and 50s had 18,000 tubes in them and housing all these tubes and cooling the rooms from the heat produced by 18,000 tubes was not cheap. The transistor promised to solve all of these problems and it did so. Transistors, however, had their problems too. The main problem was that transistors, like other electronic components, needed to be soldered together. As a result, the more complex the circuits became, the more complicated and numerous the connections between the individual transistors and the likelihood of faulty wiring increased.

In 1958, this problem too was solved by Jack St. Clair Kilby of Texas Instruments. He manufactured the first integrated circuit or chip. A chip is really a collection of tiny transistors which are connected together when the transistor is manufactured. Thus, the need for soldering together large numbers of transistors was practically nullified; now only connections were needed to other electronic components. In addition to saving space, the speed of the machine was now increased since there was a diminished distance that the electrons had to follow.

* 1. Development of electronics

Electronic engineering is a discipline that utilizes the behavior and effects of electrons for the production of electronic devices (such as electron tubes and transistors), systems, or equipment. In many parts of the world, electronic engineering is considered at the same level as electrical engineering, so that general programs are called electrical and electronic engineering. (Many UK and Turkish universities have departments of Electronic and Electrical Engineering.) Both define a broad field that encompasses many subfields including those that deal with power, instrumentation engineering, telecommunications, and semiconductor circuit design, amongst many others.

The name electrical engineering is still used to cover electronic engineering amongst some of the older (notably American) universities and graduates there are called electrical engineers.

Some believe the term electrical engineer should be reserved for those having specialized in power and heavy current or high voltage engineering, while others believe that power is just one subset of electrical engineering (and indeed the term power engineering is used in that industry). Again, in recent years there has been a growth of new separate-entry degree courses such as information and communication engineering, often followed by academic departments of similar name.

The modern discipline of electronic engineering was to a large extent born out of radio and television development and from the large amount of Second World War development of defense systems and weapons. In the interwar years, the subject was known as radio engineering and it was only in the late 1950s that the term electronic engineering started to emerge. In the UK, the subject of electronic engineering became distinct from electrical engineering as a university degree subject around 1960. Students of electronics and related subjects like radio and telecommunications before this time had to enroll in the electrical engineering department of the university as no university had departments of electronics. Electrical engineering was the nearest subject with which electronic engineering could be aligned, although the similarities in subjects covered (except mathematics and electromagnetism) lasted only for the first year of the three-year course.

The invention of the triode amplifier, generator, and detector made audio communication by radio practical. (Reginald Fessenden's 1906 transmissions used an electro-mechanical alternator.) The first known radio news program was broadcast 31 August 1920 by station 8MK, the unlicensed predecessor of WWJ (AM) in Detroit, Michigan. Regular wireless broadcasts for entertainment commenced in 1922, from the Marconi Research Centre at Writtle near Chelmsford, England.

While some early radios used some type of amplification through electric current or battery, through the mid 1920s the most common type of receiver was the crystal set. In the 1920s, amplifying vacuum tubes revolutionized both radio receivers and transmitters.

In 1928, Philo Farnsworth made the first public demonstration of purely electronic television. During the 1930s, several countries began broadcasting, and after World War II, it spread to millions of receivers, eventually worldwide.

Ever since then, electronics have been fully present in television devices. Nowadays, electronics in television have evolved to be the basics of almost every component inside TVs.

One of the latest and most advance technologies in TV screens/displays has to do entirely with electronics principles, and it’s the LED (light emitting diode) displays, and it’s most likely to replace LCD and Plasma technologies.

* 1. Data processing and Data processing systems

Data processing is simply the conversion of raw data to meaningful information through a process. Data is manipulated to produce results that lead to a resolution of a problem or improvement of an existing situation. Similar to a production process, it follows a cycle where inputs (raw data) are fed to a process (computer systems, software, etc.) to produce output (information and insights).

Generally, organizations employ computer systems to carry out a series of operations on the data to present, interpret, or obtain information. The process includes activities like data entry, summary, calculation, storage, etc. A useful and informative output is presented in various appropriate forms such as diagrams, reports, graphics, etc.

Data processing is any process that a computer program does to enter data and summarise, analyses or otherwise convert data into usable information. The process may be automated and run on a computer. It involves recording, analysing, sorting, summarising, calculating, disseminating and storing data. Because data are most useful when well-presented and actually informative, data-processing systems are often referred to as information systems. Nevertheless, the terms are roughly synonymous, performing similar conversions; data-processing systems typically manipulate raw data into information, and likewise information systems typically take raw data as input to produce information as output. Data processing may or may not be distinguished from data conversion, when the process is merely to convert data to another format, and does not involve any data manipulation. A software code compiler is an example of a software data processing system. The software data processing system makes use of a computer in order to complete its functions. A software data processing system is normally a standalone unit of software, in that its output can be directed to any number of other information processing subsystems.

* 1. Computer Systems Architecture

Computer architecture is a specification detailing how a set of software and hardware technology standards interact to form a computer system or platform. In short, computer architecture refers to how a computer system is designed and what technologies it is compatible with.

As with other contexts and meanings of the word architecture, computer architecture is likened to the art of determining the needs of the user/system/technology, and creating a logical design and standards based on those requirements.

A very good example of computer architecture is von Neumann architecture, which is still used by most types of computers today. This was proposed by the mathematician John von Neumann in 1945. It describes the design of an electronic computer with its CPU, which includes the arithmetic logic unit, control unit, registers, memory for data and instructions, an input/output interface and external storage functions.

There are three categories of computer architecture:

* System Design: This includes all hardware components in the system, including data processors aside from the CPU, such as the graphics processing unit and direct memory access. It also includes memory controllers, data paths and miscellaneous things like multiprocessing and virtualization.
* Instruction Set Architecture (ISA): This is the embedded programming language of the central processing unit. It defines the CPU's functions and capabilities based on what programming it can perform or process. This includes the word size, processor register types, memory addressing modes, data formats and the instruction set that programmers use.
* Microarchitecture: Otherwise known as computer organization, this type of architecture defines the data paths, data processing and storage elements, as well as how they should be implemented in the ISA.