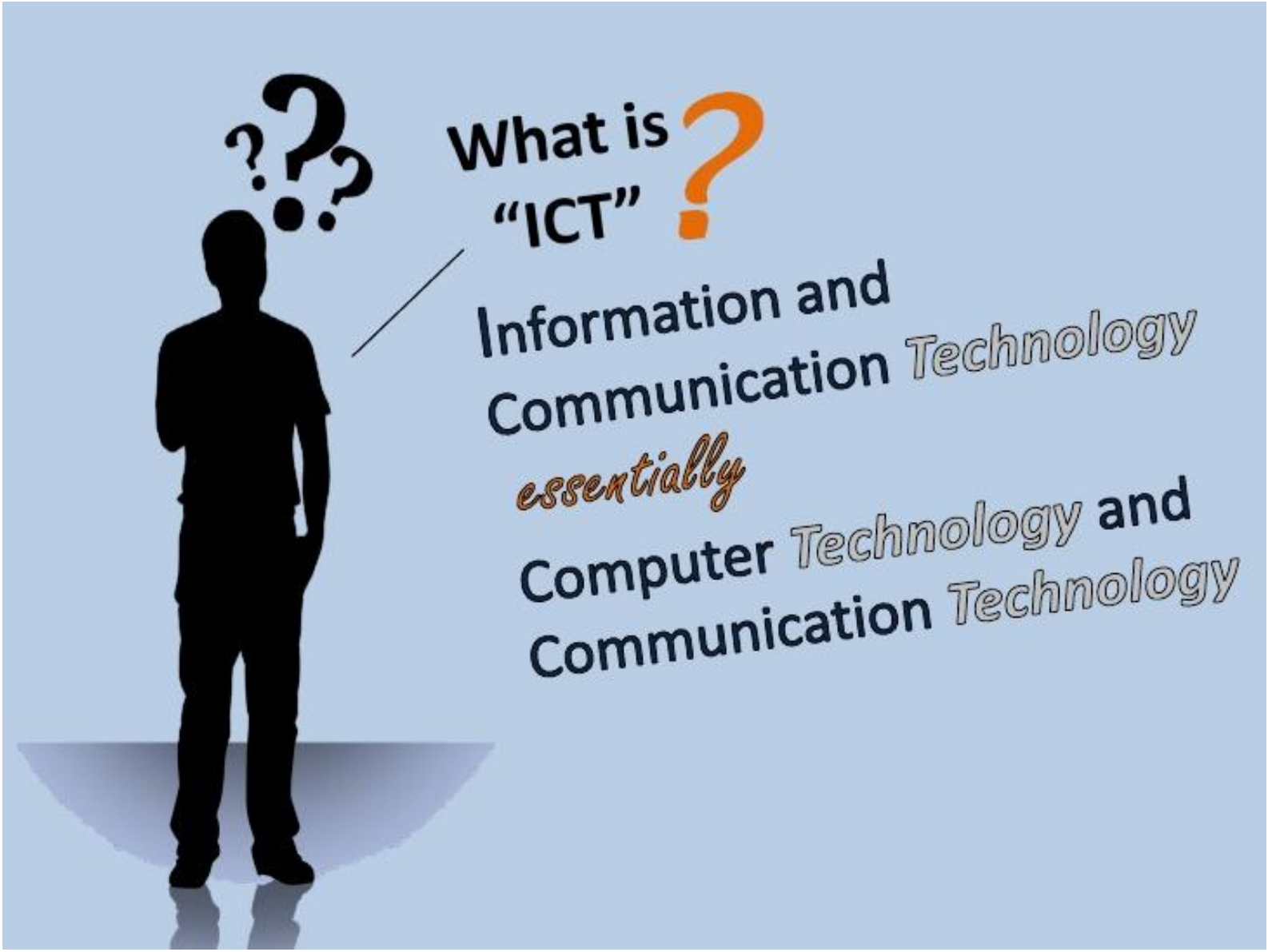
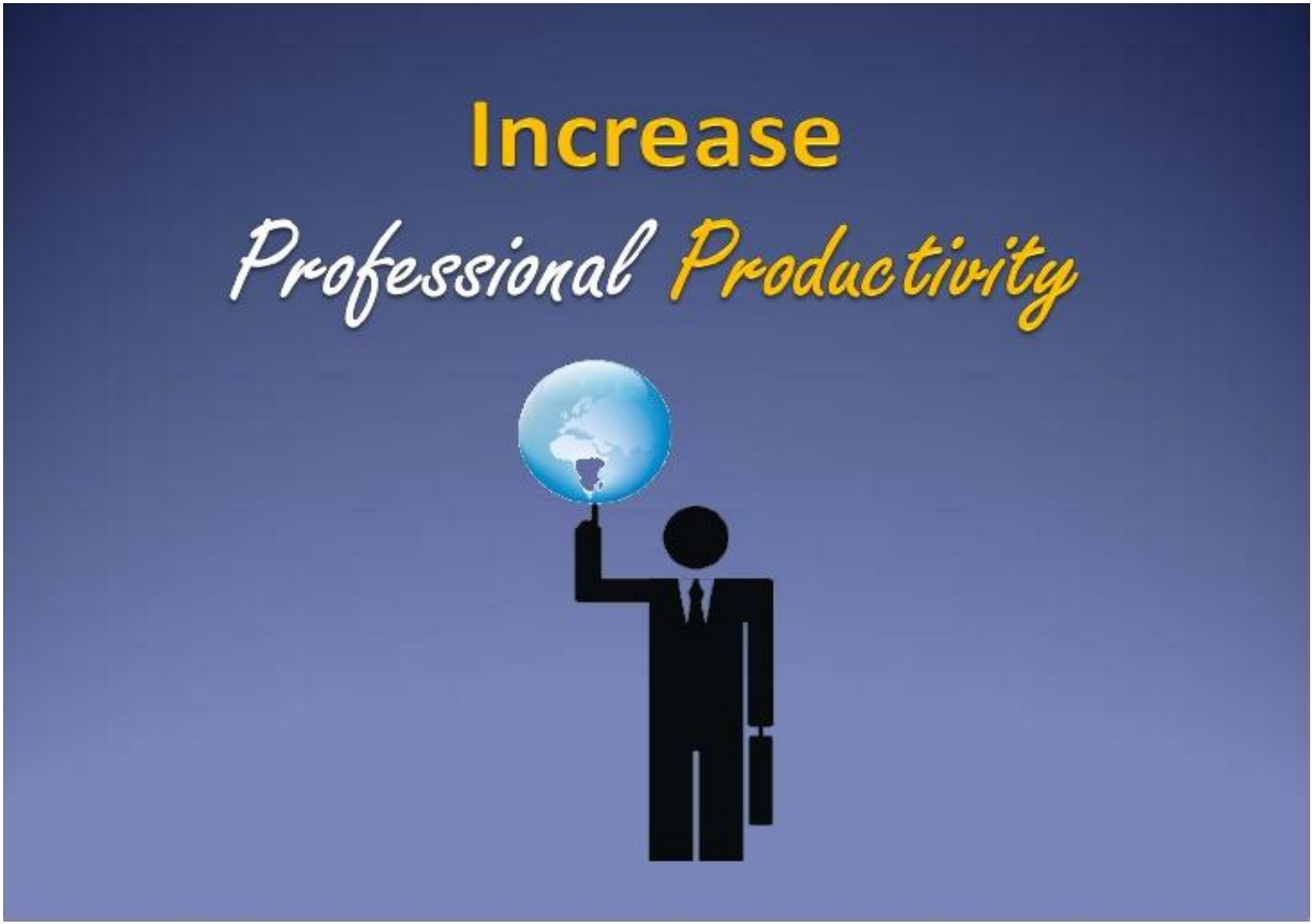
Role of ICT in the key sectors of development of society. Standards of ICT

Lecture's Outline

- What is ICT?
- Why study ICT?
- Computer and Communication Technology
- What is application of ICT?
- What is the role of ICT in our life?
- Changes in life of human being with development of ICT
- Digital&Analog data
- Binary Representation
- Standards of ICT


What is "ICT"
Information and Communication Technology
essentially
Computer Technology and Communication Technology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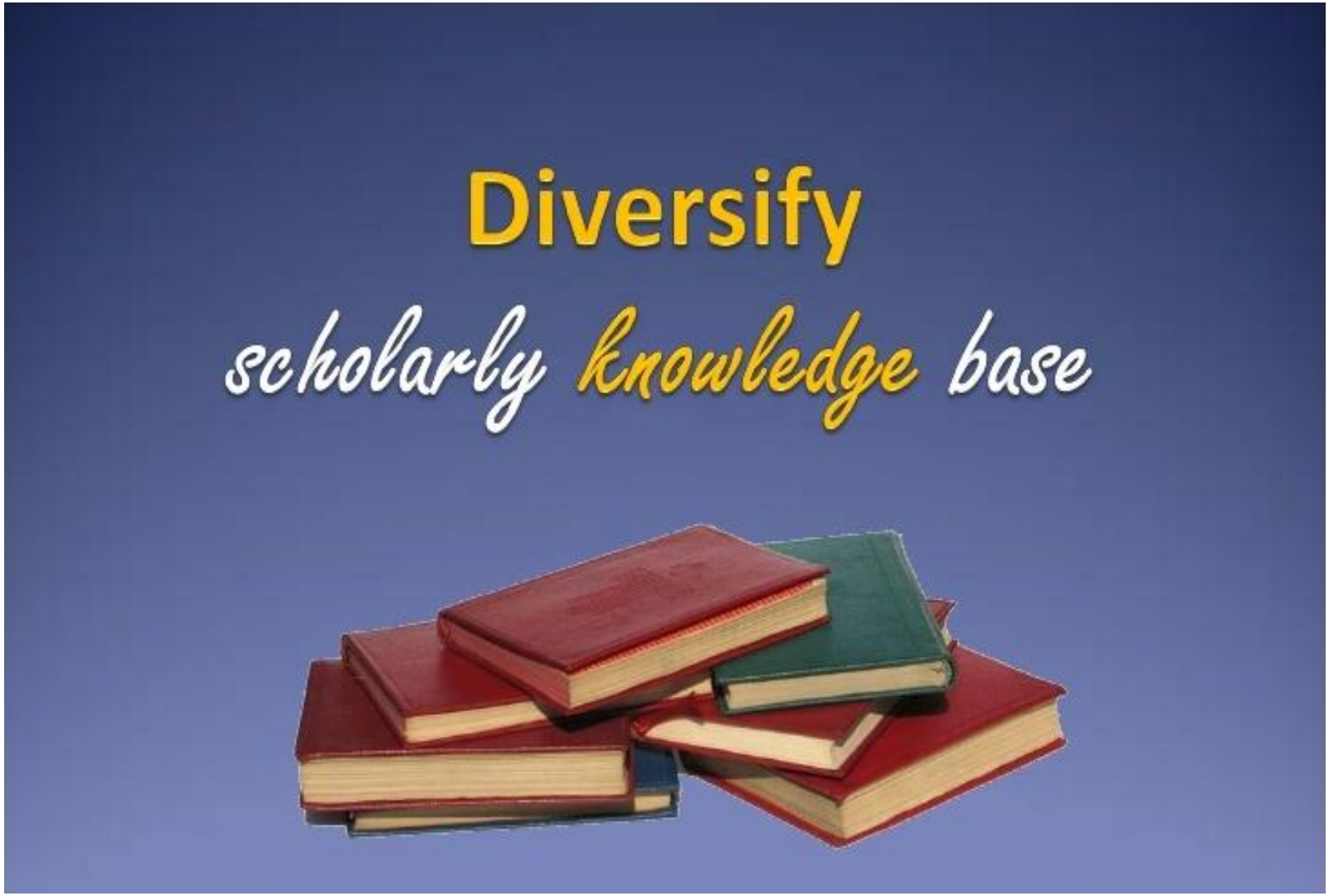
Diversify
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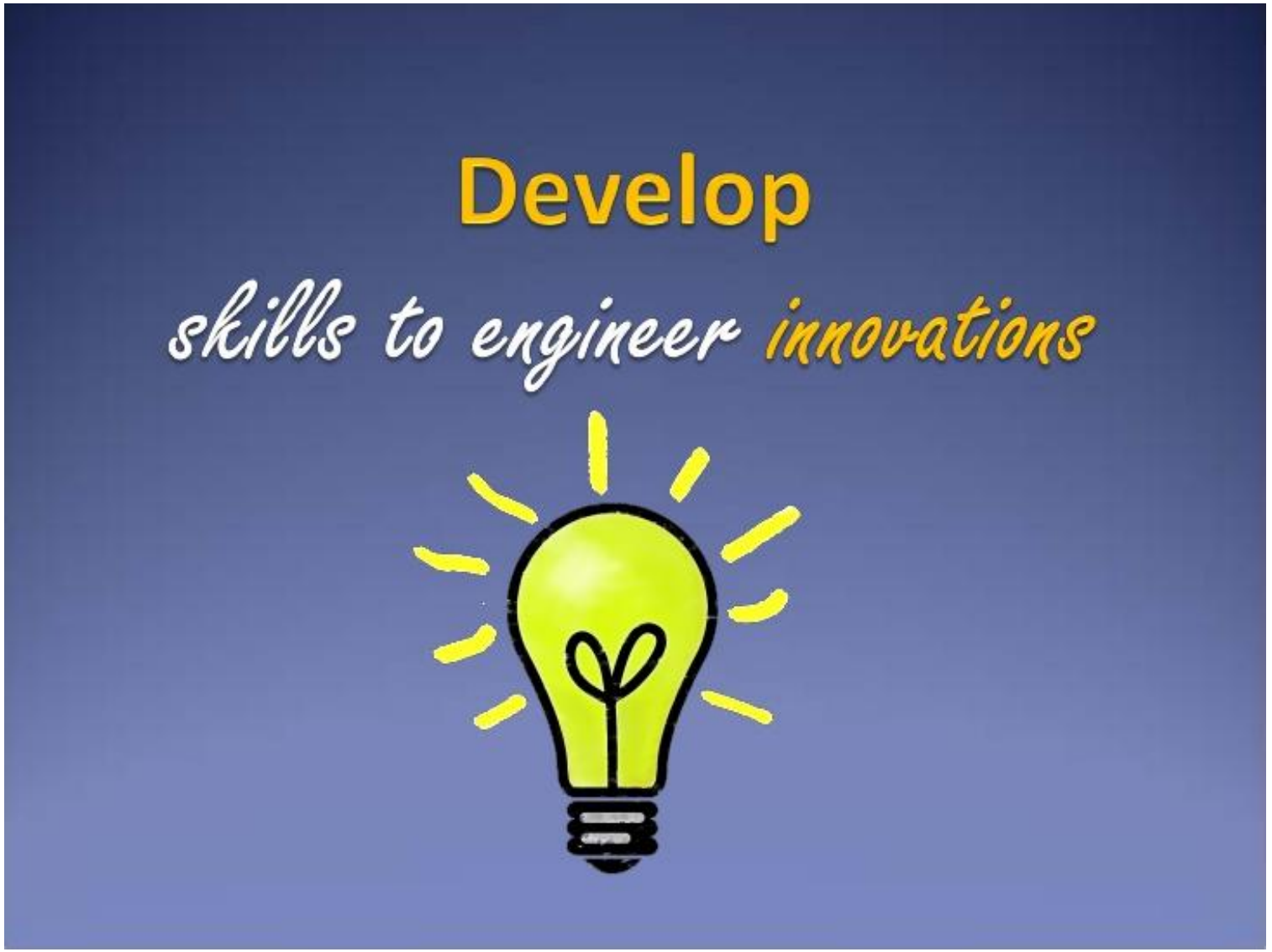
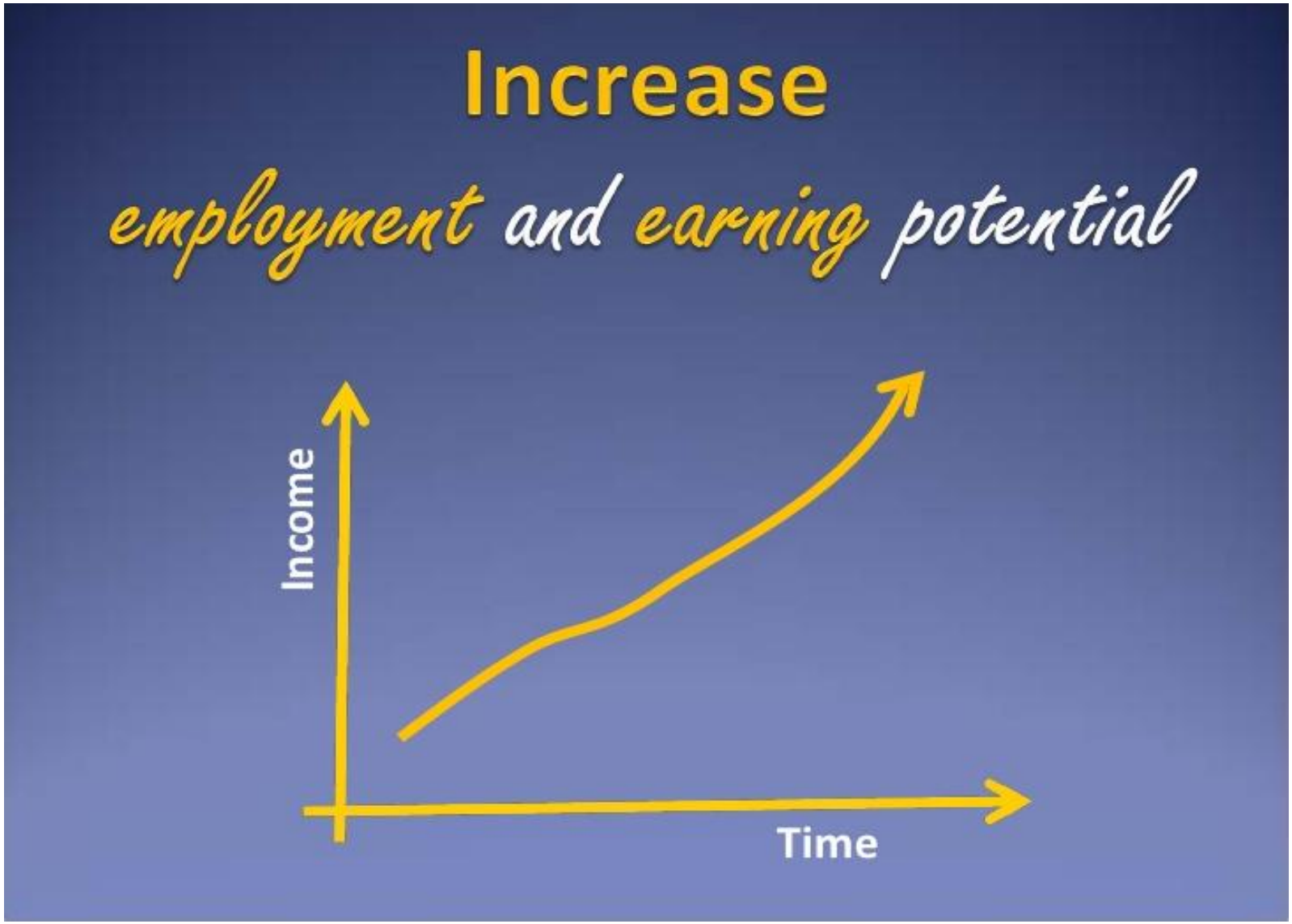

Develop
skills to engineer innovations


Increase
employment and earning potential
Income
Time

Again …

1. Increase Professional Productivity
2. Diversify scholarly knowledge base
3. Develop skills to engineer innovations
4. Increase employment and earning potential

…

Definition of ICT

ICT is a **technology** required **for information processing**, in particular, the use electronics computers, communication devices and application software to convert, store, protect, process, transmit and retrieve information from anywhere, anytime.

Another definition of ICT

ICT is defined as an industry, i.e. as a set of enterprises and organizations engaged in economic activities related to the design, production and trade of software, computing, communications equipment, consumer electronics and its components, as well as system integration, with the provision of telecommunication and information technology services (According to the Order of the Minister of Information and Communication of the Republic of Kazakhstan in Industry frame of qualifications).

One more definition of ICT

- According to the definition of Development Program of Organization of United Nations in 2003 :
- ICT is, mainly, a tool for processing information - a wide range of products, software and services that are used for production, storage, processing, distribution and exchange of information. They also include "old" ICTs, including radio, TV and telephone, as well as "new" ICT: computers, satellite systems and wireless technologies and the Internet. These different tools are now able to work together, and together they make up our "network world", a gigantic structure of the combined telephone networks, standardized computer hardware, Internet, radio and television, while using these components can be easily accessed in anywhere in the world.

As last one definition

- Information and communication technologies (ICT) in the discipline are regarded as modern methods and means of communication of people in a normal and professional activities with the help of information technologies for the search, collection, storage, processing and dissemination of information.

Information

1. Information refers to the knowledge obtained from reading, investigation, study or research.

3. The tools to transmit information are the telephone, television and radio.

5. We need information to make decisions and to predict the future. For example, scientists can detect the formation of a tsunami using the latest technology and warn the public to avoid disasters in the affected areas.

7. Information is knowledge and helps us to fulfill our daily tasks. For example, forecasting the stock exchange market.

Communication

1. Communication is an act of transmitting messages. It is a process whereby information is exchanged between individuals using symbols, signs or verbal interactions.

3. Previously, people communicated through sign or symbols, performing drama and poetry. With the advent of technology, these 'older' forms of communication are less utilized as compared to the use of the internet, e-mail or video conferencing.

Technology

1. Is the use of scientific knowledge, experience and resources to create processes and product that fulfill human needs?

3. Aiding Communication - telephone and fax machines are the devices used in extending communication.

5. Spreading Information – To broadcast information such as news or weather reports effectively. Radio, television, satellites and the World Wide Web (www) are powerful tools that can be used.

Usage of ICT in everyday life

EDUCATION

- **Teacher** use computers to research for teaching materials, participate in online forum and online conference.
- **Students** use computers as reference tools for looking information in the Internet.
- **Researchers** use computers to collect and process data.
- **School administrators** use computers for administrative purposes to ensure that entire operations run smoothly.

BANKING

- **Bank administrators** can control the entire banking system and banking activities.
- To provide electronic banking services for **customers**.
- **Businessman** can save their time by using online services offered by banks.

INDUSTRY

- To **help workers** operate machine.
- To **help researchers** analyze and collect research data for future references.
- To **help administrators** to oversee and control entire operations in the factory.
- To **facilitate production planning** and control system.

E-COMMERCE

- To **make buying and selling activities** faster and more efficient through Internet
- To **connect online customers with suppliers** to purchase products. This method can save time and cost.
- To **help employees** to communicate with their customers for any inquires and to get the latest updates inventory to be informed to the customers.


content
Shared items
Communication
ICT plays an important role to develop the system of communication. It has linked up the district Parts of the world. The present systematic and developed communication mediums such as telephone, fax , telegram, e-mail, cellular phone etc. are the results of ICT. They have decreased our time, distance and made the world closer to us.

Scientific-Exploration

The proliferation of information and communication technology is increasing day by day. By the help of ICT, the scientists have been able to invent new inventions such as computer, cable TV , the rocket by which men have landed on moon, mars and are trying to live there. Thus ICT is playing a vital role in exploring and inventing new scientific inventions.

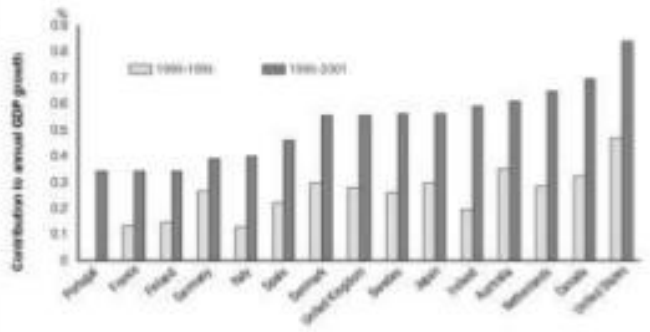
Military-Force

To protect any country from the attack of enemies, a strong and well-organized military force is a must. ICT plays as a key role to strong and organized the military force of any country by providing real information. So , it is an important component for the military sector.

Economic-Structure

Strong economical structure is the key for the development of any country. Mainly, ICT handle the economical structure of any country now a days. It strengthens the economy by providing proper knowledge about the economy of the developed countries. Thus, ICT can play an important factor for establishing a strong economy.

Figure 3: Contribution of ICT Investment to GDP Growth (selected countries)




Recreation
ICT has given us a number of recreational components , such as television , radio, tape recorder , V.C.R, D.V.D, Mp3, gramophone, etc. by which we pass our leisure sitting in our own place.

Transportation

ICT plays a significant role in our transport field. It has decreased the distance of place, saved our valuable time and established easy transporting. so we can travel hundreds of miles within a very short time, send goods any where swiftly. All of this facilities are the gift of ICT.

Knowledge-Management

ICT has made more easier to process knowledge and disseminate knowledge to the users. It has increased the efficiency of the knowledge professionals in organizing and managing knowledge.

Impact of ICT on information institutions

ICT plays important roles on library and others information institutions, which are shown below:

* ICT has made information processing on digital format.
*It has made networking and sharing of information resources possible.
* It has saved the space of library by creating library materials in digital format.
* It has ensured online accessing and files transferring.
* It has increased the working speed of the library.

Impact on library materials

Due to the invention of and use of ICT in libraries, some radical changes have found on library materials, which are given below:

* Digital information's can be sent in multiple copies simultaneously over information's networks in fractions of a minute or even of a second

* Digital information's may be free or cheaper than print equivalents.

* Information can be cut or copied and pasted from one document to another very easily.

* ICT has ensured the digital information anywhere, anytime accessible.

Impact on user community

ICT has influenced deeply on user community by different ways. These ways are indicated below steps to step:

*ICT has increased the level of technology literacy of user community

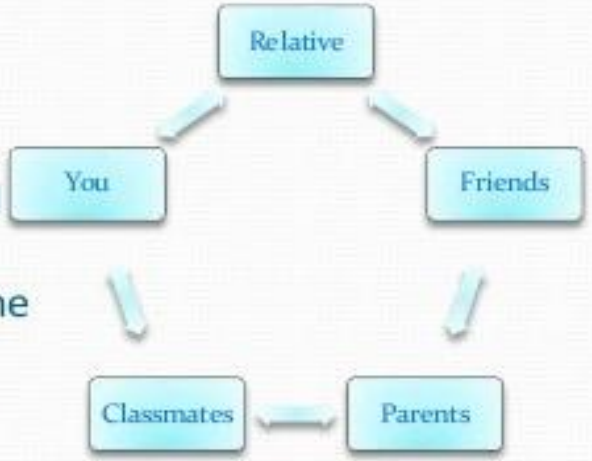
* It has increased the demand for better and faster access to information

* It has aggravated discrepancies between the information poor and information rich

* It has established a balance service for all stages of users.

* It has kept the users update by providing current information.

* It has made users skilled in using technological components i.e. computer operating internet browsing, e-mailing, chatting, etc. rapidly.



The above discussion indicates that information and communication technology is the life blood of modern research upon which depends our economical structure standard of living and our progress.

Role of ICT in Kazakhstan society

- The population's computer literacy as of 2015 is 64.1%.
- The number of internet users in 2016 is 12 million people, it's 70%.
- ICT is successfully develop in our country, our new generation use new ICT in life.
- All Kazakhstan banks has own internet banking system, which match international standards
- KazakhstanTemirJoly, AirAstana, QazaqAir, BekkAir, Skat and etc has own traffic control system
- There are E-gov system, United system for hospitals, United Taxpayers System, and etc.
- Kazakhstan government have strong support for development and using of ICT.
- KazakhTelecom and all internet providers support development of internet spread in all the regions of Kazakhtan.

Computing Systems Data

- Usually the computing systems are complex devices, dealing with a vast array of information categories
- The computing systems store, present, and help us modify:
  - Text
  - Audio
  - Images and graphics
  - Video

Computer & Communication Technologies are either :

Analog or **Digital**

In this course, we will focus exclusively on digital computers

Since almost all the computers in use today are digital

Digital vs. Analog

- Computing systems are finite machines. They store a limited amount of information, even if the limit is very big.
  - The goal, is to represent enough of the world to satisfy our computational needs and our senses of sight and sound.
- The information can be represented in one or two ways: analog or digital.
  - **Analog data** is a continuous representation, analogous to the actual information it represents.
  - **Digital data** is a discrete representation, breaking the information up into separate (discrete) elements.

Binary Representation

- Why binary representation (as suppose to decimal or octal, etc..)?
  - Because the devices that store and manage the digital data are far less expensive and complex for binary representation.
  - They are also far more reliable when they have to represent one out of two possible values.
  - Because the electronic signals are easier to maintain if they carry only binary data.

Binary Representation (2)

- One bit can be either 0 or 1. Therefore, one bit can represent only two things.
- To represent more than two things, we need multiple bits. Two bits can represent four things because there are four combinations of 0 and 1 that can be made from two bits: 00, 01, 10,11.
- In general, n bits can represent 2^n things because there are 2^n combinations of 0 and 1 that can be made from n bits. Note that every time we increase the number of bits by 1, we double the number of things we can represent.

Standards of ICT

- Allow communication and sharing of information
- Allow computing systems and software to interoperate (at both hardware and software levels)
- Sometimes standards are arbitrary and have some “blast from the past” (due to historical evolution)

Standards Organizations

- ISO – International Standards Organization
- IEEE – Institute for Electrical and Electronics Engineers
- ANSI – American National Standards Institute

Examples of Standards

Type of Data	Standards
Alphanumeric	ASCII, Unicode
Image	JPEG, GIF, PCX, TIFF, BMP, etc
Motion picture	MPEG-2, MPEG-4, etc
Sound	WAV, AU, MP3, etc..

Alphanumeric Data

- Three standards for representing letters (alpha) and numbers
  - ASCII – ***A***merican ***S***tandard ***C***ode for ***I***nformation ***I***nterchange
  - EBCDIC – ***E***xtended ***B***inary-***C***oded ***D***ecimal ***I***nterchange ***C***ode (not used anymore, used to be used in IBM mainframes)
  - Unicode

Codes and Characters

- The problem:
  - Representing text strings, such as "`Hello, world`", in a computer
- Each character is coded as a byte (= 8 bits)
- Most common coding system is ASCII
- ASCII = American National Standard Code for Information Interchange
- Defined in ANSI document X3.4-1977

Unicode

- The extended version of the ASCII character set is not enough for international use.
- The Unicode character set uses 16 bits per character. Therefore, the Unicode character set can represent 2^{16}, or over 65 thousand, characters.
- Unicode was designed to be a superset of ASCII. That is, the first 256 characters in the Unicode character set correspond exactly to the extended ASCII character set.

Practical Exercises

1) If I would like to purchase tickets from Almaty to Astana, can I use ICT? Please find websites.
2) I am student, I have limited cash. How can I find place to have dinner with friends?
3) I want to go aboard to have winter rest. Let's consider different tourist places by country, by distance, by activity.
4) I would like to make chocolate cake, please find the best receipts by using internet sources.
5) I would like to go cinema, which website I can use.

Quiz

I prepared small quiz for you in order to understand how did you understand