MODULE 1

Introduction to Information and Communication Technologies

TEACHER'S GUIDE
STUDENT'S TEXT

Powerpoint Presentations

Lesson 1 - Why do Librarians need to know about ICTs and acquire Skill in their Use?
Lesson 2 - How do Computers Work?
Lesson 3 - What are the Hardware Components of a Computer?
Lesson 4 - What are the Software Components of Computers?
Lesson 5 - What are the Components of a Network?
Lesson 6 - What is the Internet?
Lesson 7 - What are the Trends and Issues in ICT Development affecting Libraries?
Empowering Information Professionals: 
A Training Programme on Information and Communication Technology

This training programme is intended for people working in libraries and information centers. The nine-module programme aims to provide them with the knowledge and skills they need to deal with the application of ICTs in library and information services. It is also intended for students and teachers of Library and Information Science.

The package was developed by the UNESCO Asia and Pacific Regional Office with funding from the Japanese Fund in Trust for Communication and Information.

The nine modules are:
- Module 1 - Introduction to Information and Communication Technologies
- Module 2 - Introduction to Library Automation
- Module 3 - Information Seeking in an Electronic Environment
- Module 4 – Creation and Management of Databases Using CDS/ISIS
- Module 5 - The Internet as an Information Resource
- Module 6 - Web Page Concept and Design: Getting a Web Page Up and Running
- Module 7 - Library Management and Promotion
- Module 8 - Digital Libraries and Open Access
- Module 9 - Intellectual Property Rights in the Digital Age

All the Modules have a Teacher's Guide and a Student’s Text.
Empowering Information Professionals: 
A Training Programme on Information and 
Communication Technology

Editor: Andrew Large 
McGill University, Canada

Module 1

Introduction to Information and 
Communication Technologies

Teacher’s Guide

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Bangkok, Thailand 
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This Module was prepared by Lourdes T. David and edited by Andrew Large under contract with UNESCO. The materials presented do not imply the expression of any opinion whatsoever on the part of UNESCO or the Japanese Fund in Trust.
Module 1
Introduction to Information and Communication Technologies

Teacher’s Guide

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Empowering Information Professionals:
A Training Programme on Information and Communication Technology

General Guidelines for Teachers

Introductory Note
Library schools are now changing their curricula to produce graduates who are prepared for the changing service requirements in libraries. The majority of practitioners, however, graduated before the advent of the Information Age or studied in schools that did not teach ICTs for various reasons. This group of practitioners is now finding itself unprepared for the new demands of the profession. This Training Programme is in response to this identified need.

People working in libraries and information centers are the primary target group of the Training Programme. It is intended to provide them with the knowledge and skills to deal with the application of ICTs to library and information services. It is also intended for use by teachers of students in library schools and of personnel in library and information centers. The Package has been developed by the UNESCO Asia and Pacific Regional Office with funding from the Japanese Funds in Trust for Communication and Information.

Rationale
In 1961, Marion Harper Jr. wrote, “To manage a business well is to manage its future; and to manage the future is to manage information.”¹ Less than 25 years later, John Naisbitt, in discussing the ten megatrends in his opinion were happening in the US, said “None is more subtle, yet more explosive, I think than this first, the megashift from an industrial to an information society.”² According to Naisbitt, “In 1950, only 17 percent of us worked in information jobs. Now more than 60 percent of us work with information as programmers, teachers, clerks, secretaries, accountants, stock brokers, managers, insurance people, bureaucrats, lawyers, bankers and technicians.” He groups librarians among professional workers who “are almost all information workers…”³ Today, society is in the “Information Age,” an age where information is power.

³ Ibid, p. 14-15
Content of the Training Programme

The Training Program contains nine Modules:

- Module 1 - Introduction to Information and Communication Technologies
- Module 2 - Introduction to Library Automation
- Module 3 - Information Seeking in an Electronic Environment
- Module 4 – Creation and Management of Databases Using CDS/ISIS
- Module 5 - The Internet as an Information Resource
- Module 6 - Web Page Concept and Design: Getting a Web Page Up and Running
- Module 7 - Library Management and Promotion
- Module 8 - Digital Libraries and Open Access
- Module 9 - Intellectual Property Rights in the Digital Age

All the Modules have a Teacher's Guide and a Student’s Text. The Teacher's Guide should not be distributed to the students.

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Prerequisites

- Module 1. The student must have a genuine interest in understanding the impact of new information technologies on the practice of Library and Information Science.
- Modules 2 - 9. The student must have finished Module 1

Materials and Equipment

The teacher and the students must have the facilities and technical support required to carry out the course. They must have CD-ROM drives and online access to the Internet. The teacher must be knowledgeable and skilled in using computers, the Internet, CD-ROMs and a variety of software and other electronic resources. Copies of the core materials could be downloaded and printed out if desired.

- Teacher’s guide
- Student’s Guide
- Hands-on exercises
- Computer system
  - Recommended:
    - CPU—Intel Celeron D336 or Intel Pentium 506 (2.66)LGA 775 or higher
    - Memory—512 MB PC400 DDR
    - Hard Drive—WD 40GB 7200RPM
    - CD-ROM/DVD drive (52x CD-ROM combo drive or 52 DVD combo drive)
    - Monitor—15-17” CRT or LG EZ 17” Flatron
    - Modem—56 k or DSL or Cable
    - AVR—500 w
    - Printer—Laser
  - Minimum
    - Pentium IV Processor
    - 128 MB RAM
- Operating system software (Windows 98 with all the updates or Windows XP Service Pack2/XP Professional)
- Application software MS Office 2000
- Other applications (Acrobat Reader, Multimedia Flash Reader)
- Internet access
  - If dial-up: modem card, phone and Internet Service provider.
  - If DSL: integrated LAN card and Internet Service provider.
  - Internet Cafes and other service centers.
- Communication Tools. Asynchronous communication by e-mail, discussion groups and synchronous communication such as chat tools and virtual conference will be used as needed and whenever possible. Video will not be used due to possible limitations in access capabilities of some students.
Teaching Tips for Face-to-Face Instruction

- Speak slowly and clearly to ensure that students can follow you – this is especially important if some or all the students do not have English as their first language.
- Do not read your lecture notes verbatim. This is a sure way of losing your students’ attention.
- Always show an interest in what you are teaching.
- The Modules have been carefully planned, with exercises and discussions as well as lectures. Try to follow the schedule as set out in the Module.
- Try to use examples as often as possible to explain concepts. If the examples are taken from the students’ own countries or regions, so much the better.
- Try to keep within the daily timetable recommended for the Module – if you get behind in one lesson it may be difficult to make up time in a later lesson. Avoid extending the class beyond the time period allotted.
- Be prepared to use back-up materials if for any reason the computer will not function during a lesson.
- Try to answer all questions from students, but if you do not know the answer to a question it is better to admit it than to try and bluff.
- Make sure that all equipment needed for a lesson is working properly before the lesson begins – things can often go wrong!
- Be ready to stay behind for a few minutes after each lesson to answer questions that students may have but that they did not wish to ask in class.

Module Evaluation
At the end of the Module, ask your students to evaluate it. The evaluation of the Module by the students is meant to help you improve your teaching and should be seen in this light rather than as a criticism of yourself. Make use of it to do an even better job next time. The evaluation form is found after the last lesson of each Module.

Typographical conventions
The following conventions are used throughout the Module.

Course Guide
General introduction to the Module

Course Objectives
General introduction to the learning outcomes of the Module
Note
General note to the teacher and additional information

Tip
Teaching tips and supplemental materials

Activity
Activity for the students

Assessment
Questions/activities to measure learning

End of General Guidelines
Module 1
Introduction to Information and Communication Technologies

Teacher’s Guide

Overview

This is the **Teacher’s Guide for Module 1** of *Empowering Information Professionals: A Training Programme on Information and Communication Technology*. Module 1 is an introduction to information and communication technologies (ICTs).

Module 1 covers the basic concepts of information and communication technologies, the impact of ICTs on society and the reasons why librarians need to acquire ICT knowledge and skills. It is a prerequisite for the other eight modules. Prior knowledge could be credited but the student must take and pass all the tests for the seven (7) lessons in Module 1 to be allowed to take the other eight modules.

**Learning Outcomes**

The goal of this Module is to provide the practising librarian with the skills and knowledge needed to handle the demands of the Information Age. In addition, it will provide insights into the role of the librarian in an information society.

By the end of the Module, students should be able to:

1. Understand the characteristics of the Information Society and the developments that led to its growth
2. Appreciate the growth of the information industry; its impact on library and information service; and on librarians and other information professionals
3. Appreciate the capabilities of the computer as a productivity tool in the creation, collection, consolidation and communication of information.
4. Understand the different components of a computer system and computer networks, their classification and functions within the computer system.
5. Understand and acquire skill in using software such as word processors, electronic spreadsheets, and electronic presentations.
6. Be aware of trends and ethical, legal and technological issues concerning the use of ICTs in libraries and information centers.

Schedule

<table>
<thead>
<tr>
<th>Day</th>
<th>Lessons</th>
</tr>
</thead>
</table>
| Day 1 | Lesson 1. Why do librarians need to know about ICTs and acquire skill in their use?  
         Lesson 2. How do computers work?                                      |
| Day 2 | Lesson 3. What are the hardware components of a computer?                |
| Day 3 | Lesson 4. What are the software components of a computer?                |
| Day 4 | Lesson 5. What are the components of a network?                         |
|       | Lesson 6. What are the components of the Internet?                      |
| Day 5 | Lesson 7. What are some trends and issues that you need to know about concerning ICTs? |

Module Outline

**Lesson 1. Why do librarians need to know about ICTs and acquire skill in their use?**

**Scope**
- What are ICTs?
- What is the impact of ICTs on society?
- What is the impact of ICTs on library and other information centers?
- What is the impact of ICTs on the librarian and on library education?
- What are the major trends and issues in libraries that are related to ICTs?

**Objectives**
At the end of this lesson, students should be able to:
- Identify the impact of ICTs on the work environment in libraries.
- Realize the impact of ICTs on information formats, access and delivery.
- Recognize ICTs as tools that librarians can and must use to meet the information requirements of users.

**Lesson 2. How do computers work?**

**Scope**
- What is a computer?
- What are the elements of a computer system?
- What are the different types of computer systems?
- What are the components of a data processing cycle?
- What is the role of a computer in the

**Objectives**
At the end of the lesson, students should be able to:
- Describe how computers process information.
- List the elements of a computer system.
- Identify the different types of computer systems and their uses.
- Explain the data processing cycle.
### Lesson 3. What are the hardware components of a computer?

**Scope**
- What is hardware?
- What is an input device?
- What is a processor?
- What is an output device?
- What is a storage device?
- What other hardware is found in a computer?
- What are some general trends in the development of computers?

**Objectives**
At the end of this lesson, students should be able to:
- Define the hardware components of a computer system.
- List major input and output devices.
- Explain the functions of processing, memory, storage and communication devices.
- Realize the significance of each hardware component in processing information.
- Be familiar with general trends in the development of the different hardware components of a computer.

### Lesson 4. What are the software components of a computer?

**Scope**
- What is software?
- What are the two kinds of software?
- What is programming?
- What are viruses and how do you deal with them?
- How do computers respond to different character sets?
- What are some general trends in software development?

**Objectives**
At the end of this lesson, students should be able to:
- Define the function of software in a computer system.
- Distinguish between an operating system and an application system.
- List different types of operating systems and application software.
- Define what are programming languages.
- Identify and avoid computer viruses.
- Compare different character sets.
- Be aware of general trends in software development.

### Lesson 5. What are the components of a network?

**Scope**
- What is a network?
- What are the components of a network?
- What are the different types of networks?
- What are the different LAN topologies?
- What is an intranet? Internet?

**Objectives**
At the end of this lesson, students should be able to:
- Define what is a network.
- Identify the components of a network and their role in the network.
- Describe the different types of
- What are the trends and issues in the development of networks?
- Discuss the different LAN topologies.
- Differentiate between WAN and LAN/intranet and Internet.
- Enumerate trends and issues in the development of networks.

### Lesson 6. What is the Internet?

**Scope**
- What is the Internet?
- What Internet tools are available?
- What is the World Wide Web?
- What is e-mail? FTP? Chat?
- What are online information resources?
- Why is the Internet important to libraries?
- What are some issues and concerns in using the Internet?

**Objectives**
At the end of this lesson, students should be able to:
- Define what is the Internet and other Internet concepts and terms.
- Describe Internet tools and services.
- Identify information resources for libraries on the Internet.
- Use online information resources on the Internet.
- Realize the importance of the Internet to libraries.
- Discuss some issues and concerns regarding the use of Internet in libraries.

### Lesson 7. What are some trends and issues that you need to know about ICTs?

**Scope**
- What are the legal and regulatory issues that affect ICT applications?
- What are the ethical and moral concerns in using ICTs?
- What political, social, and economic factors should be considered in using ICTs?
- What are the main security issues concerning computer use/Internet access?
- What technological concerns must be addressed in using ICTs in libraries?
- What are the main policy issues relating to ICTs, and which developments in ICTs might affect library services?

**Objectives**
At the end of this lesson, students should be able to:
- Identify the trends and issues in ICT developments and applications.
- Be aware of the legal, ethical, moral, social, economic, and technological concerns relating to computer use/Internet access.
- Define various policy issues related to ICTs in libraries.
- Recognize developments in ICTs that will affect library services.
Grading Policy

A score of 85 points is needed to pass the Module. The breakdown of the points for the Module exercises is as follows:

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<th>Points</th>
</tr>
</thead>
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<td>10</td>
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<tr>
<td>Lesson 2. How do computers work?</td>
<td>10</td>
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<tr>
<td>Lesson 3. What are the hardware components of a computer?</td>
<td>10</td>
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<tr>
<td>Lesson 4. What are the software components of a computer?</td>
<td></td>
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<tr>
<td>Windows 98 or Higher</td>
<td>10</td>
</tr>
<tr>
<td>Word Processing</td>
<td>10</td>
</tr>
<tr>
<td>Spread sheets</td>
<td>10</td>
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<tr>
<td>Presentation</td>
<td>10</td>
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<tr>
<td>Lesson 5. What are the components of a network?</td>
<td>10</td>
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<tr>
<td>Lesson 6. What are the components of the Internet?</td>
<td>10</td>
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<tr>
<td>Lesson 7. What are some trends and issues that you need to know about ICTs?</td>
<td>10</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
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</tbody>
</table>

List of Activities

Lesson 1

**Activity 1.1.1**

Ask the students to discuss the effects of ICTs in their life. Cite two concrete examples and elaborate.

**Activity 1.1.2**

Form groups and discuss the effects of ICT developments on your libraries. Focus on what are the problems, possible solutions and opportunities brought by the changes. Wrap it up by asking each group to present to the class as a whole a summary of what was discussed.

Lesson 2

**Activity 1.2.1**

Ask the students to read more about the history of the computer and its development by reading computer books and magazines. Make a timeline of important events in PC history.
**Activity 1.2.2**

Before concluding the activity, ask the students to state their opinion about the application of ICTs in libraries in their country.

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**Lesson 3**

**Activity 1.3.1**

**Do the following hands-on exercises.**

1. Check if the hardware is connected to an AVR or a UPS that is connected to a power supply.
2. Turn on the AVR or UPS.
3. Switch on the computer by pushing the button marked power. Wait for the computer to finish “booting up.”
4. View the computer’s basic system information flashed on the screen while booting up, e.g. the operating system, processor type, installed RAM (random-access memory) etc.
5. View the computer’s desktop configuration: date & time, volume settings, desktop display options (e.g. background options, screen settings, screen saver options etc.).
6. Use the mouse to shut down the computer.
7. Close the AVR or UPS.
8. Remove the plug from the wall socket.

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**Lesson 4**

**Activity 1.4.1**

Do the following hands-on exercises. This will also be your assessment for this lesson.

**Use an operating system (Windows) (10 points)**

1. Open computer.
2. Click on the start button.
3. Choose Windows Explorer and click to open the application.
4. Explore the icons and what you can do with them.
5. Select and move desktop icons. Create a desktop icon.
6. Work with Windows. Recognize the toolbar, menu bar, status bar, scroll bar etc.
7. Reduce a desktop window, enlarge a desktop window.
8. Recognize the different parts of a desktop bar, toolbar, menu bar, status bar, scroll bar.
9. Insert a diskette on the diskette drive. Format the diskette.
10. Create a new folder. Label it with your name.
11. Open the folder by pointing the mouse at it and clicking. You will not see anything in it.
12. Open the "my documents" folder. Choose a file and drag the document to your folder.
13. Open the folder with your name on it.
14. Open the file in the folder by double clicking on it.
15. Save the file in your folder on to your diskette.
16. Drag your folder to your diskette.

Organize files
1. Examine a directory/folder. View some of the attributes: name, size, date when last updated etc.
2. Re-name files and directories/folders.
3. Copy, Move, Paste, Delete files.
4. Make backup copies of data onto a diskette.
5. Use Cut and Paste functions to move files within directories/folders.
6. Use the Find tool to locate a file or a directory/folder.
7. Search by name, date created, file or directory/folder type.
8. Delete directory/folder.

Use a word processing software (10 points)
1. Open a word processing program by pointing and clicking on start, going to programs and then to word.
3. Open a new file.
4. Compose a short description about yourself (about five sentences).
5. Save the file by pointing at the "file" on menu bar and clicking on "save as". Give the file a name and save in the folder “my documents”.
6. Edit the file by using the icons or the menu under "format."
7. Print the file.
8. Save file onto a diskette.

Use other editing operations
1. Use Insert command.
2. Use Undo command.
3. Use Insert command.
4. Use Select command.
5. Use Copy, Paste, Move commands.
6. Use Search and Replace command.
7. Change fonts, use italics, underlining, and embolding.
8. Use alignment and justification.
9. Use lists.
10. Use templates.
11. Add headers and footers.
12. Create tables.
13. Import objects and resize.
14. Use spell check and grammar check.
15. Save file.
17. Prepare to print.

**Use a spreadsheet (10 points)**
1. Open a spreadsheet application.
2. Open an existing spreadsheet and make some changes and save.
3. Open several spreadsheets. Close all files one by one.
4. Create a new spreadsheet.
5. Enter numbers in a cell.
6. Enter text in a cell.
7. Enter symbols or special characters in a cell.
8. Enter simple formulas in a cell.
9. Use the Undo command.
10. Select a cell or range of adjacent or non-adjacent cells.
11. Use the Copy and Paste tools to duplicate cell contents in another part of a worksheet.
12. Use the Cut and Paste tools to move cell contents within worksheet.
13. Move cell contents between active worksheets.
14. Move cell contents between active spreadsheets.
15. Delete cell contents in a selected cell range.
16. Insert rows and columns.
17. Modify column width and row height.
18. Delete selected rows or columns.
19. Sort data.
20. Use basic arithmetic and logical formulas in a spreadsheet addition, subtraction, multiplication, and division.
21. Use the sum function.
22. Use the average function.
23. Format cells to display different currency symbols.

**Use a presentation software (10 points)**
1. Open a presentation application.
3. Create a new presentation.
4. Choose a slide layout form.
5. Choose background.
6. Add text.
7. Add an image from an image library.
8. Copy, Move, and Delete text.
9. Use the Copy and Paste tools to duplicate text, to duplicate a slide within the presentation or re-order slides within the presentation.
10. Delete a slide/slides within the presentation. Use formatting commands.
11. Re-size and move text box within a slide.
12. Import images/slides from other files.
13. Re-size and move an image in a slide.
14. Import other objects to slide.
15. Copy an imported object to a master slide.
16. Number the slides.
17. Print slides in various views and output formats.
18. Add/change transition/preset animation effects to slides.
19. View the slide show.
20. Close application.

Lesson 5

Activity 1.5.1
Look at a network card and examples of cables and connectors for the different types of cables.

Lesson 6

Activity 1.6.1
Hands on exercises in searching the Internet (World Wide Web, using web browsers and using some Internet tools and services).

Lesson 7

Activity 1.7.1
Group discussion. Form into groups and list all issues and concerns regarding the use of computers and the Internet in libraries. Elaborate by citing cases and actual situations. Sum up by creating policy guidelines that could be used to address such issues and concerns.
Assessment

Lesson 1

Assessment 1.1

Answer the following (10 points):
1. What is the impact of ICTs on you as an information professional?
2. What is the impact of ICTs on your library?

Answers should emphasize the following:
1. Librarians must learn new skills and acquire new knowledge.
   - Use of ICTs
   - Knowledge about ICT applications in library operations, information searching, new formats of information, and information delivery
2. ICTs will raise the image of the library, improve efficiency of operations, provide faster communication, increase user satisfaction, etc.

Lesson 2

Assessment 1.2

Answer one of the following:
1. (10 points) Is an automated teller machine (ATM) a computer? Prove your answer by discussing the functions and capabilities of the ATM in terms of the following aspects:
   - Its general characteristics
   - Its input function(s)
   - Its processing function(s)
   - Its output functions(s)
   - Its storage function

2. (10 points) If the library where you are working is not yet using computers, identify at least three services or functions that can be improved through the proper use of computers. Explain how these services or functions can be improved. On the other hand, if the library where you are working is already using computers, identify at least three functions and services that were improved with the introduction of computers. Compare how these functions or services were performed before and after computers were introduced.

Answers should emphasize the following:
1. The ATM is a computer terminal. It is connected to the server of the bank.
   - It can accept input, it can produce output information but it processes and stores information in the server.
2. Usually the answer will be cataloguing, circulation and access (OPAC) in both cases (i.e whether or not the library is automated)
Assessment 1.3

You are asked to buy a computer for the library by your director, what specifications will you recommend and why (10 points).

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<td>RAM</td>
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<td>Monitor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CD-ROM/DVD Drive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Printer</td>
<td></td>
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</tr>
</tbody>
</table>

Answer:
Please look at the computer specifications listed in the requirements above. As a general rule, the higher the capacity the better the performance.

Assessment 1.4

The activities provided are also the assessment exercises. Please see list of activities for Lesson 4 above. Grade will depend on how well the student performed in the exercises.

Assessment 1.5

Answer the following.
(10 points) What is a computer network? Enumerate the benefits that can be derived by your library from the use of a computer network.

Assessment 1.6

Answer the following.
(10 points) What is the Internet? Enumerate the benefits that can be derived by your library from the use of the Internet.
Assessment 1.7

Answer the following.

(10 points) What are some trends and issues in ICTs and libraries?

Reading/Reference List

14. PC Guide: Introduction to the PC
   http://www.pcguide.com/intro/index.htm

Glossary

Module 1

1. Access. Refers to the ability of the user to connect to a database, or Internet service.
2. Address. A label that designates the location of data in a storage device.
3. Applications software. A program that is designed to perform a specific task.
4. Arithmetic and logic unit. That portion of the CPU that performs calculations and logical operations.
5. ASCII. The encoding system, the American Standard Code for Information Interchange.
6. Backup. Pertains to a procedure or device to make a duplicate of a system or data for future use in the event of loss from the server or hard disk due to various factors.
7. Barcode scanners. Hardware used to scan bar codes.
8. Binary notation. A base two numbering system used to represent data.
10. Boot. The procedure used to start up the computer where the operating system is loaded from the hard disk to the RAM.
11. Byte. A group of eight bits used to designate a character, a number or a symbol. It is also used to designate storage capacities, e.g., KB refers to 1000 bytes, MB to 1000 KB, and so on.
12. CD-ROM. Compact Disk Read Only Memory, a type of laser disk used for storing data.
13. Central processing unit. The component of the computer that interprets instructions.
15. **Communication devices.** Hardware used to transmit data from one location to another.

16. **Communications network.** Group of interconnected computers and communications devices that allow data to be communicated back and forth. Examples are local area networks (LANs) and wide area networks (WANs).

17. **Communications software.** A program that allows the computer to emulate a terminal and transfer files from one computer to another.

18. **Compiler.** A software used to convert the source code into the internal code of the computer.

19. **Computer.** A programmable electromechanical machine. Same as central processing unit. Same as processor.

20. **Computer network.** Computers and computer systems that are linked together for purposes of sharing resources. Similar to a communications network.

21. **Computer system.** A term used for the collection of hardware and software that includes the CPU, input devices, output devices, and storage devices.

22. **Data.** A representation of fact.

23. **Data entry.** The encoding of data into machine-readable form.

24. **Database.** The data resource for all computer-based information processing.

25. **Desktop computer.** A personal computer that can be placed on top of a desk but could not be brought along conveniently like a laptop.

26. **Digital.** Refers to information and/or communications signals represented in two states or in binary format—0 and 1 or on and off.

27. **Diskette.** A thin flexible disk made of plastic that is used for the storage of data. Same as floppy disk.

28. **DOS.** Disk Operating System.

29. **Electronic mail.** A communications tool used to send messages to and from computers. Also called e-mail.

30. **Electronic resources.** Any information material that is stored in digital format in any of the secondary storage devices such as hard disk, floppy disk, CD-ROM, etc.

31. **Electronic spreadsheets.** The software that permits recording of data in columns and rows and its manipulation using mathematical operators.

32. **Flatbed scanners.** An input device that produces images of sheets of paper or any flat piece of document.

33. **Hard copy.** A readable printed copy.

34. **Hard disk.** A rigid metallic magnetic storage medium.

35. **Hardware.** The physical devices that make up a computer system.

36. **Icons.** Pictographs that are used in a Windows environment to indicate operations such as copy, save, delete, etc.

37. **ICTs.** Information and communications technologies.

38. **I/O.** Input output devices.

39. **Information.** The output of information processing. Useful data.
40. **Information Society.** A society that is very dependent on information. A society that treats information as a commodity that is necessary for survival.

41. **Information system.** Generally a computer-based system for storing and retrieving data and information.

42. **Input.** Data encoded into the computer for processing.

43. **Input device.** Any hardware used to encode data such as the keyboard or the mouse.

44. **Intellectual property rights.** Recognized legal claim to ownership of recorded or manifested ideas.

45. **Input hardware.** See input device.

46. **Internet.** A global network of computers communicating under one set of guidelines formally called the TCP/IP.

47. **Intranet.** An internal network belonging to an organization that uses TCP/IP with access limited only to members of the organization.

48. **Joystick.** An input device that moves the cursor on the screen by pushing a vertical stick.

49. **K.** An abbreviation for kilo or 1000 as in KB for kilobytes.

50. **Keyboard.** A device for data entry that uses alphanumeric keys.

51. **LAN.** An abbreviation for local area network or a system of computers located within a small area linked together to share resources.

52. **Magnetic disk.** See hard disk.

53. **Mainframe computer.** The second largest computer after the super computer. It is capable of great speeds of processing and large storage.

54. **Memory.** Primary storage or random access memory (RAM).

55. **Microprocessor.** A computer on a single chip.

56. **Minicomputer.** A computer which is smaller than a main frame but bigger than a microcomputer.

57. **MIS.** Management information system. An information system generally designed for managers to aid them in making decisions.

58. **Modem.** (Modulator-demodulator). A data transmission device used to convert digital signals from computers to analog signals used by non-digital transmission lines, and vice-versa.

59. **Monitor.** A cathode ray tube used for display of soft copy output from a computer.

60. **Motherboard.** A microprocessor circuit board that is used to house the microprocessor, memory and other electronic cards used to handle tasks performed by a computer. Also called a system board.

61. **Mouse.** An input device that is moved across a smooth surface to point the cursor at an icon and initiate a particular task by clicking on it.

62. **MS-DOS.** The disk operating system for a desk top.

63. **Multimedia.** Refers to information represented in more than one medium such as text, graphics, animation, video, etc.

64. **Networks.** See computer network.

65. **Online.** Refers to the connectivity of a computer to a network.

66. **Online access.** Pertains to the accessibility of a computer during the
information processing cycle as differentiated from off-line.

67. **Operating system.** The program that manages all the tasks performed by the computer.

68. **Output.** Information retrieved from the computer through an output device.

69. **Output device.** The hardware used to produce output from the computer.

70. **Personal computer system.** A microcomputer such as the desktop or the laptop.

71. **Pointing device.** Hardware that is similar to a mouse and a joy stick and used for inputting data.

72. **Processor.** Same as microprocessor or computer.

73. **Primary storage.** The main memory or RAM where all programs and data reside during processing.

74. **Program.** A set of instructions for the computer to perform a particular function. Also called software.

75. **Programmer.** A person who writes a program.

76. **Programming language.** The codes used by programmers in writing programs. The output of programming is a source code, which is later on compiled by the computer into machine language or object code. Examples are: COBOL, FORTRAN, etc.

77. **RAM.** (Random Access Memory) See primary storage.

78. **ROM.** (Read Only Memory) A storage device that can only be read, not written to.

79. **Software.** Same as program.

80. **Soft copy.** Copy which is displayed on the monitor screen.

81. **Storage device.** Hardware that is used to store data. It usually refers to secondary storage devices such as the hard disk.

82. **Supercomputer.** Largest, fastest computer available.

83. **System software.** Same as operating system.

84. **Touch screen.** An input-output device that is activated by touching the screen of the monitor.

85. **Trackball.** An input device that is a variant of the mouse but looks like an inverted mouse.

86. **User friendly.** Used to describe a user interface that enables the inexperienced user to interact successfully with the computer.

87. **VDT.** (Video Display unit) Similar to the CRT or the monitor.

88. **WAN.** (Wide area network). A network of computer systems that is not confined to a single location.


**End of Overview for Module 1**
Module 1
Introduction to Information and Communication Technologies

Teacher’s Guide

Lesson 1: Why do Librarian’s need to know about ICTs and acquire Skill in their Use?

Introduction
The lessons are presented to the students as PowerPoint slides as shown in the title slide below. The Teacher’s Guide will provide you with information and tips on how to explain each slide. It will also provide you with exercises/activities that you can ask the students to do.

Slide 1. This is the title slide for lesson 1.

Tip
Establish rapport with the students by asking them to answer the question on the title slide. This will serve as a motivation activity by letting them know that you are interested in what they know and that you give importance to what they have to say. This will also encourage them to actively participate in the lecture / discussion. Their answers in turn, no matter how brief they are, will help you gauge their understanding of the subject matter. There is no need to discuss their answers at this point.
Slide 2: Rationale

**Tip**

This slide provides justification for the lesson. Inform the participants that this Module aims to provide adequate ICT knowledge and skill to the students to help them cope with the challenges of ICTs and train other library and information personnel in their workplace or even throughout the region.

Use this slide to encourage students to share experiences and training about ICT applications in libraries.

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Slide 3: Scope

**Notes**

Slide 3 provides an overview of the scope of the lesson. The lesson is about ICTs and their impact on society, the library, and library education. It also discusses the major trends and issue resulting from the development of ICTs.

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Slide 4: Learning Outcomes. This slide provides an insight into the expected learning outcomes for the lesson.

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Slide 5: What are ICTs?

**Notes**

Information Communications Technologies (ICTs) are those technologies that enable society to create, collect, consolidate, communicate, manage and process information in multimedia and various digital formats for different purposes. The convergence of technology, media and communication (technological convergence) brought about an enormous impact on the way we live, work, think and play. These changes are prevalent in our everyday lives such as the use of e-mail, cellular phones, ATMs, CD-ROMs and DVDs. They also link facets of society such as business, education, military, recreation, transportation, communication, scientific exploration and knowledge management.
Mention to the class that during the last decade, the greater use of information by organizations to gain a competitive advantage and by individuals to acquire knowledge and skills to improve the quality of life marked the end of the industrial age and the birth of the Information Age. ICTs brought about a transition from analog to digital forms of information creation and delivery; thus the Information Age is also known as the digital age.

**Slide 6: Impact of ICT**

**Notes**

What is the Information Society? There is no single definition of the Information Society. The Information Society Forum (1996) in its First Annual Report defines the scope of the Information Society by stating that,

> “The Information Society is already part of many lives and at the heart of many economic activities. If we use fax/e-mail we have a toe in the Information Society. If we surf the World Wide Web we have a foot in the Information Society. If we work, learn and communicate with colleagues through a network, we are in the Information Society.”

Nick Moore (1997), in his paper “Future demand for information professionals in Europe,” described the Information Society as being characterized by:

- The use of information as an economic resource to increase efficiency, stimulate innovation, and increase effectiveness and competitiveness.
- The greater use of information by the general public to improve their choices as consumers, explore entitlements to public services, and improve the quality of their lives.
- The development of a European information sector to satisfy the demand for information facilities and services.

The main concern of the Information Society is the welfare of people from all nations, not just the digital technology. Globalization of the world economy and access to information offers a chance for poorer countries to keep pace with richer countries through information, yet at the same time there is the risk that the gap between rich and poor will increase even further. Libraries are re-examining their roles in the light of developments in the information industry to ensure that this gap is filled. Libraries must continue to provide equal access to information for all. Archives, on the other hand, are finding ways of documenting and preserving knowledge in whatever form that is available. Rudenstine (1996) observed that “the library and the Internet are being viewed...
as a versatile unified system, providing an enormous variety of materials, in different formats – so that data, texts, images, and other forms of information can be readily accessed by students and faculty alike.”

In general, the Information Society is characterized by the use of information for a competitive advantage. During the agricultural age and the industrial revolution employment opportunities were found on farms or in factories. In the age of information, employment trends shifted from the production of goods to the production of information and the rendering of quality service to the consumer.

Slide 7: Computer Linked to all Facets of Society

Activity 1.1.1

Ask the students to discuss the effects of ICTs in their life. Cite two concrete examples and elaborate.

Slide 8: What is the Response of Industry and Government to the Information Society?

Notes

The computing and telecommunications industries have responded enthusiastically to the demands of society. In fact, industry has pushed these changes and been continuously working and introducing products into the market that are more powerful than the previous one. More innovative and useful applications of technology have found their way both into the corporate world and as consumer products. The Information Society has created employment opportunities for the creation, organization, communication, and acquisition of information in multimedia formats, as well as the necessary hardware, software and communications facilities to meet consumer demand for this information.

Realizing the importance and the role that ICTs play in society, each country is in the process of creating a policy, or is already implementing its own national information infrastructure initiatives that aim to use ICTs as a vehicle for economic growth and stability, Singapore’s “IT2000 - A Vision of an Intelligent Island” - is an example.
The information industry has been very responsive to user demand. Technological changes have made possible increased capacity and faster speeds to process, store, and transfer information. The information industry is concerned with the following:

- providing content;
- producing software and hardware to process, store, and transfer information;
- establishing and managing communications facilities and networks.

Content is any form of new materials. These can be original works by writers, composers, artists, researchers, etc., compilations of information such as abstracting and indexing services, and various kinds of reference materials. These are available in various formats including print, audio-visual, multimedia, and CD-ROM, DVD, and online via the Internet.

Electronic publishing started in the early 1960’s. It was used originally to facilitate the production of print materials. Among the first printed publications was the *Index Medicus* published by the US National Library of Medicine. Further developments in computing and communications led to online indexing services like DIALOG.

Producers of hardware and software are concerned with the design, manufacture and marketing of equipment for capturing, processing, storing, retrieving and delivering information. The software developers provide:

- operating systems such as UNIX and Windows, and
- application packages such as word processing, spreadsheets, database management systems and presentation software.

Hardware developers continue to design and manufacture computers that are smaller in size but have greater storage capacity and faster processing speeds than their larger predecessors. This continuous development of smaller, faster computers has enabled software and content developers to produce more efficient programs. Developments in telecommunications technologies have also complemented the developments in computer software and hardware.

Telecommunications companies establish and manage information networks such as cable television networks, telephone networks, etc. These networks provide a means of communicating/transferring information directly to the consumer. The global information network is known as the Internet or the World Wide Web.
Slide 9: What is the Impact of ICTs on Libraries and other Information Centers?

Notes

ICTs have enabled the information industry to produce more information in different formats. They have also helped improve the delivery of information. The developments in ICTs led to the Internet and 24x7 online access to information. In the midst of these developments, there is a risk that the gap between the information rich and the information poor may increase. The vision for an Information Society includes an informed citizenry. As librarians, we have the responsibility to provide users with access to information to bridge the gap between the rich and the poor. Libraries must continue to reduce if not completely eliminate this gap.

Slide 10: Shift from Print to Digital. This illustrates how the shift to digital information has affected libraries.


Notes

The shift from print to digital information has a high impact on libraries, information centers and other institutions directly involved in processing information. This shift is generally attributed to the merging of computing, telecommunications technologies and other industries. Computers have permeated society because of their ability to perform high volume, error-free repetitive tasks at speeds much faster than human beings, while recent and emerging developments in the area of computing, telecommunications, networking and resource sharing made access to information anytime, anywhere possible.

Digital information made access fast and efficient. It led to the development of e-resources in libraries. It challenged librarians to become IT-literate and it challenged librarians to reassess their roles and the services they provide to users.

Digital information has challenged the way libraries are managed. It led to the creation of new library policies and procedures and organizational structures.
Organizations use information as an economic resource. The proper management of information can lead to increased levels of productivity, standards of quality, and marketability, therefore raising the level of competitiveness of the organization.

In the manufacturing industry, information is used extensively in research and development, management of the production process, marketing of the product, and management of administrative functions. Extensive research can lead to good products. Yet, product development entails not only activities in the laboratory but also market research to determine the demand. The impact of poor market research is illustrated by the production of “sweet Coke,” as an alternative to Pepsi. In this case study, it was pointed out that the manufacturers of Coke concentrated on the production of a version of Coke which had a taste similar to Pepsi. They forgot to ask Coke enthusiasts if they wanted their Coke to taste like Pepsi. The result was a disaster. Loyal Coke fans refused to buy the “sweet Coke.” (Kotler, 1993)

Information collected about the demand for a product will also help in scheduling production to prevent an oversupply of goods. A properly managed inventory system could lead to a situation when warehouses are no longer needed and therefore could result in greater profits because stocks will always be moving.

The automation of information has revolutionized the airline and banking industries through the introduction of automated reservations and automated teller machines. Accessing information from a variety of sources within seconds is not only useful for meeting customer's needs, but can also benefit the company. Following this path, the long-term success of credit card companies is dependent on monitoring the usage behaviors of clients.

In the public sector, automation is used extensively in clerical and administrative tasks to improve the level of employees' efficiency. It is also useful in creating databases based on personnel files, electronic payment systems, attendance records, and supplier files. The information provided by these databases can then be used for decision-making.

Governments are also focusing on the delivery of quality education through the use of information technologies. Distance education is now a popular option for obtaining a college degree. The convergence of mass media, telecommunications and computer technologies has made quality distance education possible. The Internet offers learning at one’s own pace, while cable
television delivers multimedia information to individuals at the same time the
information is being generated. CNN is a very good example of an effective
means of global information dissemination.

We all use information in every facet of our lives. We use information to make
choices and decisions, whether it is for a product we would like to buy, a
school we would like to attend or research we would like to conduct. Consumer
groups have lobbied to have manufacturers publish product information. Results of school surveys have enabled applicants for admission
to make the appropriate choices for their career paths.

Information has allowed us to take charge of our lives. It has made us more
aware of our rights and responsibilities and of the options open to us. It has
also made us more aware of events happening in the world. With the right
information at the right time, we have a chance to make correct decisions.

Slide 13: What is the Impact of ICTs on Librarians and Library Education?

Notes

Users today are technology literate and technology competent. They expect
libraries to be ICT friendly. They also expect librarians to be IT literate. Users
who are knowledgeable about using computers and the Internet for their
research demand nothing less than a computer with Internet access. However,
this may not be true and not applicable to those who have no access to such
technologies due to financial difficulties. Thus, two different kinds of users
have emerged that libraries must respond to, namely the "haves" and "have-
nots". Ideally a balance must be maintained in providing services for both
groups so that all users will have equal access to information. This can be
effectively done through the use of powerful and appropriate technologies.
Library schools must integrate ICTs into their curricula and short courses to
produce graduates who can cope with the changing work environment.

The emergence of powerful technologies, vast amounts of information in
multimedia and other digital formats, more technologically proficient users,
and the widening "digital gap" means that libraries and librarians in particular
are faced with the great challenge of dealing with this information revolution.
Furthermore, the recent developments in the capability of computers to store,
locate, retrieve and transfer huge amounts of digital data at high speed have
contributed to the evolution of an information-based society. Libraries must
respond to this development in order to remain relevant and important to the
society they aim to serve. However, libraries and librarians must first educate
and equip themselves with the necessary knowledge and skills before they can
deal with this enormous challenge.

Since the majority of librarians in Asia were schooled when access to information was still limited by space, there is now a need for intervention to enable them to acquire new knowledge, new skills, and use new tools. In addition, the curricula in library schools need to be restructured to meet the new and ever changing demands of librarians in an information society. In both cases, the scope of training should cover knowledge, skills, and tools. They are broken down into the following: (A Curriculum for an Information Society. UNESCO, 1998).

- Knowledge
  1. Subject knowledge
  2. User behavior
  3. Information needs
- Skills
  1. Communication
     o Inter-personal
     o Written
  2. Information design
  3. Management
     o Project management
     o Financial management
     o Personnel management
  4. Marketing
  5. Information skills
     o Searching
     o Indexing
     o Abstracting
     o Classification
  6. Research skills
  7. Information technology skills
     o Basic ICT
     o ICT applications in Library and Information Science
     o Trouble shooting


Notes
The roles of librarians in an information-based society have changed from relatively passive "gatekeeper" to proactive facilitators of knowledge and
information. The profession is continuously evolving into something that is not only concerned with the traditional practices of processing information but also actively involved in the application of ICTs in libraries and the development of new services using recent and emerging technologies.

The librarian in the Information Society plays a dynamic role in the provision of service to the library’s community. The following is a list of some perceived roles that the librarian in a digital library environment will perform (CETUS, 1997):

- Partnering with discipline-based faculty and other specialists for delivery of information and instruction.
- Designing instructional programs for information access.
- Teaching students and faculty how to access information, whatever its format or location, and how to evaluate what they find.
- Serving as consultants on information resources, issues and problems.
- Developing and implementing information policy.
- Creating information access tools.
- Selecting, organizing, and preserving information in all formats.
- Serving as leaders and facilitators in introducing information technologies and ensuring their effective use.

Other non-professional library staff will assume increasing supervisory and administrative responsibilities formerly administered by professionals, such as managing the circulation unit or acquisitions.

Libraries meet the educational, cultural, leisure and general information needs of the present and future society. They are one of the most heavily used institutions in managing and preserving knowledge. The electronic age is changing the information-seeking patterns of society, but libraries will continue to be an essential tool for accessing information.

The need for libraries stems from their two primary roles: to provide equal access to information, and to provide instruction and assistance in locating information for specific needs. In the digital age, for example, some people cannot afford the hardware, software and telecommunications equipment necessary to access information available only electronically. In the same manner, they also cannot afford the equipment to store large amounts of information indefinitely. Libraries will have to fill these needs. In cases where people can afford the technology, they will still have need for librarians who are skilled in accessing the right information in the shortest possible time. These clients will request librarians to send the information directly to their desktops.

The convergence of information and telecommunications technologies makes the communication of information through a global network possible. Today
there are millions of computers throughout the world attached to this communications network. With continuing developments in ICTs and publications in electronic media several scenarios for libraries of the future can be depicted.

Slide 15: What will be the Trends in the Development of Libraries?

Notes

Libraries now and in the future will be quite different from the traditional libraries that we know today. Books and other printed materials will still be available, but many will be available and accessible in electronic format. These resources can be easily accessed and shared through LANs (local area networks), and WANs (wide area networks), of which the best example is the Internet. Most of the collections will be in multimedia and various digital formats. The libraries' collection will not be limited to what is inside the libraries since access to information globally is readily available. Eventually, digital libraries will become common and most of the resources will be digitized and available to anyone, anytime, anywhere. There is even a prediction of virtual libraries where all information resources and the library itself will no longer exist physically but will exist digitally in the virtual world.

The Libraries of the Future

For several centuries, paper has been the medium for information storage, and hence libraries evolved around the print medium. The introduction of multimedia information resources and networked information systems are affecting the basic role of the library to acquire, store, provide access and disseminate information. The publication medium of any item greatly influences the manner, in which it is stored, managed, retrieved, and disseminated. The evolution of libraries will be dependent on developments in publication media and in technology. Libraries will have to evolve from their paper-based collection in order to accommodate multimedia publications. User demand will require computer-based systems to manage the library and move towards a digital library.

According to Barker (1997), there are four possible types, “polymedia libraries,” “electronic libraries,” “digital libraries” and “virtual libraries.”

- **Polymedia libraries.** These libraries will be similar to libraries as we know them today. They will have a wide range of media - paper, microfilm, print, electronic, etc. - for the storage of information and knowledge and will be managed manually. They will continue to acquire the books, periodicals, and other materials necessary to maintain the
collection, but they will also have to contend with the management of electronic information materials using manual systems of organizing and servicing the collection. Polymedia libraries will remain keepers of the intellectual, cultural, and historical records of man and are predicted to be dominant for the next 20 years.

- **Electronic libraries.** Libraries serve different types of communities. They must respond to the information needs of the community that they serve. In the face of rapidly proliferating electronic media and communications facilities, libraries must determine how to organize information materials to match the growing service requirements of the community. Electronic technologies will permit electronic libraries to make use of more rapid organization, storage, and dissemination of information.

Electronic libraries will have a core collection of materials in various formats for immediate response to the basic information needs of users. They will also have integrated library systems for more efficient library operations. Access to the collection will be through electronic indexes either on a local file server, a CD-ROM server, or online directly to the host via the Internet. Electronic libraries will also have full-text information databases or will collect journals and other materials in electronic format.

These types of libraries will have interoperability and interconnectivity with other electronic libraries for resources sharing. This will lead to new legal, economic and cultural problems. For example can a library download materials from the network if the material is illegal in the home country? They will also have to establish relationships with other groups and institutions like publishers, book vendors, and authors. A thorough knowledge about what is covered and not covered by copyright will then become paramount to adequately formulate policies with these groups and institutions.

There will be a conscious movement in these libraries to replace print and other non-electronic formats for reasons of efficiency and accessibility. As a result, arrangements with authors, publishers, vendors, etc. will need to be made regarding the creation, publication, dissemination and use of information.

The ability to satisfy a variety of users will lead many libraries throughout the world to choose electronic libraries. They will be able to accommodate a researcher who wants fast access to information, the ordinary user who wants leisure reading, and the general public who wants both types of access. In the end, they will be able to provide services to a broader base of users.
• **Digital libraries.** All of the information contained in these libraries will be digital and only accessible via computers or telecommunications networks. According to Lerner (1998), however,

> “The Digital Library is: The collection of services and information objects, the support base for users dealing with information objects, the organization and presentation of those objects directly or indirectly via electronic means”

In other words the term “digital library” concerns not only the materials contained therein, but also the attendant services and users of the library. According to Lancaster (1997) many predict that the future library will be digital, that is, the entire collection will be in electronic form.

Noerr (1998) prepared a “Digital Library Tool Kit” for the purpose of providing librarians and information professionals with a guide for setting up a digital library. The publication is divided into three sections. The first section covers issues to be raised and questions to be resolved before decisions should be made; the second deals with planning and implementation guidelines; while, the third provides an insight into available resources, current research on digital libraries, examples of existing digital libraries, and future research trends.

• **Virtual libraries.** A virtual library is defined in terms of its collection. It has no collection of its own. It is a library dependent on the collections of other libraries. It is a "library without walls." Any individual who has access to the information network can browse and retrieve information and have his/her own virtual library.

• A virtual library can also be defined in terms of its services. The virtual library is not concerned with managing a collection. It is concerned with selecting, acquiring, and organizing information for a particular user’s request. A library without a collection of its own could be a referral center or switching center with only guides, indexes, abstracts, and other tools to improve access to information resources. It could also be an information storehouse of the most relevant and recent electronic resources downloaded and provided to its user community. A library of this nature will organize and make available to its users different levels of information accessibility. Some will be available in the library only, others will be distributed to the users automatically (push technology or SDI as we know it today), others will be distributed on demand. In this type of library, the user provides an information needs profile so that the librarian can craft relevant search strategies, collect relevant information for those needs, and forward then to the user’s personal database. Future systems are envisioned to have online filtering systems for information to be delivered directly to the individual’s
personal computer.

- **What types of virtual library options are available?**
  - A virtual library co-existing with a conventional one which will provide a gateway to digital information available outside the library.
  - A virtual library co-existing with a digital one. In this scenario, all holdings will be digitized, providing a gateway to digital information available outside the digital library.
  - A virtual library with guides to resources and services in digital format.

**Slide 16: Challenges to Libraries.** This slide describes challenges for libraries of the future some of which are: new formats and the availability of information 24 x 7. The library may feel threatened.

**Notes**

**Things to consider in planning and implementation**

- User needs. Who is your target audience and what information do they need?
- Technology needs. What are your present resources? What do you need to add?
- Staff needs. Who will run the virtual library? What skills are needed?
- How much will it cost?
- What fees will be charged? Should they cover maintenance costs?
- Who will study the system and prepare the specifications?
- Who will prepare proposal requests?
- Who will evaluate the proposals?
- Who will install and test the system?
- Who will evaluate the system?

**Issues for libraries (Griffin, 1997)**

- Technological issues: New hardware and software are developed within 18 months. Libraries need to keep up with developments but at the same time must think of the possibility of losing information once the hardware to access digital information recorded in the past becomes obsolete.
- Organizational issues: New expertise and knowledge are required of staff. New organizational structures are also required to provide for new functions and activities.
- Economic issues: Keeping up with developments requires funds allocation. New ways of collection development and document delivery systems must be explored to keep costs down.
- Legal and regulatory issues: Copyright and censorship need to be attended to. Materials that are legal in some countries might be banned in others.
The Internet has no boundaries in terms of access and dissemination of information. How does the concept of “fair use” for printed materials acquired by libraries apply to electronic documents?

Implications for managers
Given the above scenarios for the future library, managers can opt to choose which type of library they would like to build. Building an electronic or digital library along the lines of the traditional library requires extensive project organization, a well-conceived framework, and additional funds. New staff is required to find, organize, and maintain materials for the public’s disposal. In reality there will exist two systems, the old library with its polymedia collection and the digital library, since it will be more difficult and slower to dismantle the old than build the new. Successful implementation of a digital library project will place too many demands on personnel and new staff will have to be employed.

There are handbooks to assist managers in building libraries of the future. However, managers must take into account the rapid rate of developments in ICTs. To cope, the big jump should be preceded by small feasible projects. This will enable the manager to learn from the projects and keep pace with technology developments. The same principles and concepts in embarking on computerization projects will apply to the building of digital libraries. Managers still have to contend with software, hardware, staff skills, information resources, telecommunications infrastructures, and user needs and behaviors. The manager, however, must bear in mind that the digital library will never be completed. There will always be developments in technologies and availability of digital information. Information may be lost during the normal course of operations or because the equipment to read it is no longer available. The building of a library of the future is a continuing and never ending activity, although eventually it will become a regular activity within the organization. Staff skills and the organization itself are the assets in building the digital library. They provide for a successful transition into new tasks and services and the acquisition of new skills such as IT skills, identification and collection of electronic materials and trend watching. Drawbacks and pitfalls will always occur during the transition but eventually the organization, with the active involvement of staff, will be able to successfully cope with the transition.

Some issues that managers must consider are:

- The need to make decisions about a future library system (Barker, 1997).
- The need to define new roles for librarians (Moore, 1997).
- The need to acquire new knowledge about the changing information environment (Ibid).
- The need to acquire new skills to cope with the growing technological environment (Ibid).
- The need to use new tools to access and retrieve information (Ibid).
• The need for more dynamic staff interaction and communication (Griffin, 1997).
• The need to match technologies with users.
• The need to train users in the use of information technologies.
• The need to adapt to the new environment where library resources are digital and directly accessed by users and therefore not controlled by the librarian.
• The need to connect with the wider information environment like library associations, computer associations, etc.

Activity 1.1.2

Form groups and discuss the effects of ICT developments on your libraries. Focus on what are the problems, possible solutions and opportunities brought by the changes. Wrap it up by asking each group to present to the class as a whole a summary of what has been discussed.

Slide 17: Conclusion

Tip

Before concluding the lesson, ask some questions to recall and reinforce the information and concepts taught in the lesson.

Notes

Libraries and librarians must cope with the demands of the Information Society. Librarians must have the knowledge, skills and tools in handling digital information to be efficient creators, collectors, consolidators and communicators of information. Librarians with the knowledge, skills and tools required of information professionals in an Information Society will constitute the key success factor in enabling the library to perform its role as an information support system for society.

Technology alone is not the solution to efficient and effective information delivery, although it is the major contributor to the development of multimedia information and networks. The basic library education acquired in school is more important than the tools, but the tools will make information creation, acquisition, consolidation and communication more efficient. ICTs are
powerful tools that can only be used effectively if their users – administrators, librarians, and patrons in this case - have acquired adequate knowledge and skills and a certain level of competency according to their needs.

Future Research Directions in Information Technologies

- Human understanding of information processes.
- New information objects and content.
- Technology integration at the component and system level.
- Domain-specific repositories and intellectual infrastructures.
- Intelligent agents for networks’ interoperability.
- Metadata.
- Terms and conditions of intellectual properties.
- Elements enabling electronic commerce.
- Digital libraries as means for enabling collaboration.
- Human-centered systems and social informatics.
- Information-based computing.

Assessment

Assessment 1.1

Answer the following (10 points):

1. What is the impact of ICTs on you as an information professional?
2. What is the impact of ICTs on your library?

End of Lesson 1 of Module 1
Module 1
Introduction to Information and Communication Technologies

Teacher’s Guide

Lesson 2: How do Computers Work?

Introduction
The lessons are presented to the students as PowerPoint slides as shown in the title slide below. The Teacher’s Guide will provide you with information and tips on how to explain each slide. It will also provide you with exercises/activities that you can ask the students to do.

Slide 1. This is the title slide for lesson 2.

Tip
Establish rapport with the students by asking them to answer the question on the title slide. This will serve as a motivation activity by letting them know that you are interested in what they know and that you give importance to what they have to say. This will also encourage them to actively participate in the lecture / discussion. Their answers in turn, no matter how brief they are, will help you gauge their understanding of the subject matter. There is no need to discuss their answers at this point.
Slide 2: Rationale

Tip

This slide provides justification for the lesson. Inform the participants that this Module aims to provide adequate computer knowledge and skill to the students to help them cope with the challenges of ICTs and train other library and information personnel in their workplace or even throughout the region. Ask them about their background. It is assumed that participants prior to this lesson will not have adequate knowledge and skills in using computers.

Slide 3: Scope

Note

This lesson provides an overview of computers, their components and basic operations. It will also discuss how computing technology is used in data / information processing and how computers developed.

Slide 4: Learning Outcomes. This slide provides an insight into the expected learning outcomes for the lesson.

Note

A thorough discussion of the technical aspects of a computer might seem to be a daunting task. However, this should not be the case, since a very basic discussion of computer concepts will be enough for most students, especially beginners. A more comprehensive discussion of the elements of a computer system will be elaborated in subsequent lessons.

Slide 5: What is a Computer?

Note

A computer is a machine with electronic and electromechanical parts. It is programmable and is capable of performing the following basic computing
functions:
- Accepting data (input)
- Processing data
- Generating output (information)
- Storing data/information
- Retrieving/sending data/information

Everyday we deal with data, or raw unprocessed facts. When data is processed into meaningful sets or groups, it becomes information. This information is used as the basis for the decisions we make. Hence, it would be hard to imagine a life without data and as a consequence, a life without information. In fact, individuals would cease to exist, because our identity is based on a collection of data. Individual characteristics such as name, date of birth, name of parents, weight, and height are, after all, data.

Humans’ ability to gather data and process it into information is helping them further understand themselves and their environment. Being very curious by nature, men and women made every effort possible to understand the things that surround them. Throughout the centuries, they collected data and processed it into information to satisfy their insatiable curiosity. However, the human brain cannot handle information at a fast enough rate. Having realized this, humans began develop tools that not only extended their physical capabilities, but also helped them process data into information at a faster rate.

The modern day computer is one such tool. In fact, it can process data into information at blinding speeds that no human brain can ever match. Just to give you an idea, today's average computer can add numbers in a millionth of a second.

**Slide 6: How is Data Processed into Information?**

**Note**

Explain how data by itself is not useful. It must first be processed into information. The processing can be done manually or aided by a computer. The end product of such processing is useful information.

**Slide 7. What is the Role of Computers in the Information Cycle?**
The following is a brief description of the four functions of a computer.

**Input**
Input refers to the process of feeding data into the computer. A special group of tools called input devices are responsible for accepting and preparing data for processing. You can compare the computer's input function to the function being performed by our ears, eyes, and other senses for our brain.

**Processing**
The data accepted by the input devices is then passed on to another group of devices responsible for processing data into information. The data is processed based on a set of instructions or procedures called programs. At this point, the data is now in the “brain” of the computer ready to be processed.

**Storage**
Storage devices are responsible for both storing and retrieving data and programs. To a certain extent, you can compare the storage function of the computer to our capability of remembering things. However, our brain's capability to store and retrieve information is far more complicated than the computer's storage capabilities.

**Output**
Output refers to the end result of processing which can be information or another set of data that will be used by the next processing requirement. A group of devices called output devices are used for performing this function.

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**Slide 8: The Information Processing Cycle**

**Note**
The four functions are performed in phases. In the input phase, input devices are used to feed data (levels and quantity) into the processing devices. During the processing phase, programs are retrieved from storage to convert data into information. After processing, the output can be forwarded to the output devices for display or it can be passed on to the storage devices so that it can be retrieved later.
Note

Just like any system, a computer system is composed of several subsystems or components. Each subsystem performs a particular function vital to the overall operations of the entire computer system. If one subsystem is missing or rendered inoperable, the computer system will not be able to function correctly. In fact, it can even cease to function.

A computer system is composed of the following elements or subsystems:
People are very important both as developers (computer professionals) and beneficiaries (end-users) of a computer system. Although computers are highly sophisticated devices, they will not be of much use without the highly skilled computer professionals who maintain, operate, and program them. They are the developers. They are also known as peopleware or knowledgeware. They are responsible for maintaining the computer system, programming and creating the predefined sets of rules used for processing data, interpreting the output generated by the computer.

Procedures are descriptions of how things are done, i.e. manuals, documentation, etc.

Data/Information are raw facts (data) and processed data (information) that are used to produce the desired result.

Hardware is the physical element of a computer system categorized according to the basic operations performed: input, processing, output, storage and communications.

Software provides the step-by-step instructions that tell the computer what to do. Generally software is divided into system software and application software. Software refers to sets of predefined instructions, or programs. Programs dictate the type of processing performed by the hardware subsystem. The process of developing programs, programming, is completed by highly skilled computer professionals called programmers.

Communications refers to the electronic transfer of data from one place to another. There are local area networks (LANs) as well as wide area networks (WANs).
Slide 11: How is Data represented in the Computer?

**Note**

Computers represent data as two-state systems. This means that the computer recognizes only two numbers, 0 and 1. Larger numbers, letters and special characters are formed using combinations of 0 and 1. Each of these two numbers is called a bit from the words binary digit. The combination of bits to form meaningful characters or numbers is called a byte. To manipulate digital data, a computer makes use of operations such as addition and subtraction to compute for new values.

Slide 12: What Coding Schemes are used to form Meaningful Bytes of Data?

**Note**

Digital data is represented by a series of zeroes and ones combined together based on an accepted standard. These digits comprise the binary numeration system. For example, the letter A is represented as 10100001 in one standard. Since these two numbers can be combined in many ways, it is important to establish a standard coding scheme that will enable two or more computers to have the same interpretation of a particular set of digital data. There are usually 8 bits in a byte.

The coding scheme American Standard Code for Information Interchange, or ASCII (As-key), and ASCII-8 or extended ASCII have been adopted as a standard by the US Government and by computer manufacturers. ASCII can have 128 combinations of seven bits each while ASCII-8 can have as many as 1256 combinations. The computer using these coding schemes will interpret the words, statements and paragraphs formed by these characters as a string or combination of bytes.

Slide 13: Development of Computers

**Note**

The beginning of the commercial computer age began on June 14, 1951 with the delivery of UNIVAC - Universal Automatic Computer - to the US Bureau of Census. Prior to this, however, Charles Babbage invented the Difference
Engine and conceived of another machine called the Analytical Engine. The latter had all the components of the computer: input, output, processing and storage. Babbage is called the father of computers.

Slides 14-15: What are the Computer Generations?

Tip
Emphasize the development of processors and how it has affected the size and efficiency of the computer.

Activity 1.2.1
Ask the students to read more about the history of the computer and its development by reading computer books and magazines. Make a timeline of important events in PC history.

Slide 16: What are the Different Types of Computer Systems?

Note
In general, computers are sorted according to physical size and processing capabilities. They may also be classified by purpose. Right now the size of a computer is no longer a good indicator of its processing power, but generally computers that occupy more physical space are more powerful since their bigger sizes allow them to accommodate more processors and other essential devices.

Purpose
Computers can also be classified according to their purpose. Special-purpose computers are designed to perform a particular task. An example of a special-purpose computer is the pacemaker, a device used to help regulate the flow of blood to the heart. Another example of a special-purpose computer is the device used to open air bags. On the other hand, a desktop computer is an example of a general-purpose computer because it designed to perform a multitude of tasks. In this module, the discussion will be focused primarily on general-purpose computers.
Size and Capacity
Computers are also classified by size and processing capacity. In terms of size, there are computers as small as a book while there are computers that occupy an entire room or building. The amount of space occupied by a computer and its components is called its footprint. In general, the bigger the footprint, the more powerful it is in terms of processing. However, this is not always true, for there are small computers more powerful than larger ones. There are five major categories of computers in terms of size:

Microcomputers
As indicated by the prefix micro, computers under this category have small footprints. The desktop computer is an example of a microcomputer. It is called a desktop computer because the entire system can be placed on top of an office desk. However, in terms of mobility, desktop computers are still heavy and bulky, making them difficult to be carried from one place to another. To provide for mobile users’ computing needs, portable computers were developed. Smaller and lighter, portable computers are ideal for those who must bring their computer wherever they go. They include laptops, notebooks, sub-notebooks, and palmtops. Figure 2.3 is an example of a notebook. They are categorized according to size and weight. Laptop computers are the heaviest and largest, while sub-notebooks are the smallest and lightest. Although portable computers have a small footprint, they can be more powerful than a desktop computer or a bigger computer. Microcomputers are considered very easy to use and maintain and combined with affordable price tags are the computer of choice.

Workstations
In addition to having slightly bigger footprints than microcomputers, workstations are also more powerful and expensive. They are typically used for applications beyond the processing capacity of microcomputers or for projects that are graphic-intensive. For example, computer-generated effects that we see on TV and in the movies are created using workstation computers.

Minicomputers
As implied by the prefix mini, computers under this category are in the middle in terms of size, processing capacity, and price. Minicomputers are typically used to support the computing needs of medium-sized enterprises such as a university library.

Mainframes
Computers under this category are bigger, more powerful, and of course, more expensive than the three other categories. Mainframe computers are used to provide for the computing needs of large enterprises such as banks and manufacturing firms and can be used by several users simultaneously. But being big and powerful has its downside: mainframe computers are confined
inside special air-conditioned rooms to prevent them from overheating. In fact, in older models, these giants were actually water-cooled! In terms of its operation, a team of skilled computer professionals is needed to keep a mainframe computer operational. Mainframe computers are at times fondly called refrigerators or air conditioners because of their outside appearance. The IBM® 4331 is an example of a mainframe computer.

**Supercomputers**
The supercomputer is considered the most powerful computing device. Supercomputers are typically used to focus on a single, yet very complicated task such as prospecting for oil or studying weather phenomena such as tornadoes and typhoons. Supercomputers are so powerful that they can process tasks that would normally require multiple mainframe computers to be combined. Aside from being kept inside an air-conditioned room, a special cooling system is incorporated into the supercomputer to prevent it from overheating. A Cray® computer is an example of a supercomputer.

**Slide 17: What are the Advantages of using Computers for Data Processing?**

**Note**
There are many advantages to using computers for a variety of tasks. These are:

**Speed**
Today’s computers are so fast that their processing speeds are measured not in seconds, but in milliseconds (one thousandth), microseconds (one millionth), nanoseconds (one billionth), and picoseconds (one trillionth). This means that while you are reading this sentence, a typical desktop computer has already completed millions of tasks!

**Accuracy**
Computers are very accurate, provided that the programs they use for processing are accurate. They are capable of performing calculations involving very large numbers or very small numbers. For instance, computers are used to compute the distance between planets, and the size of an atom and its sub-particles. A computer’s accuracy also lends itself to applications involving the correct handling of monetary amounts by banks, stock markets, etc.

**Consistency**
Computers are not only fast and accurate, but they also are consistent when it comes to the output they can generate. For instance, if a computer is programmed to compute for the sum of two numbers, it will do so for as long
as it is running. Once the program is accurate, a computer will have no problem generating a consistently correct output.

Data storage
Computers can store large quantities of data. By today’s standards, a typical desktop computer is capable of storing data in the range of 3 to 4 billion characters.

Remote access
One computer can send and retrieve data to and from other computers if in a network. For example online public access catalogs (OPACs) can be accessed from outside the library, for example via the Internet.

Communication
Data of all kinds, including pictures and videos, can be exchanged between computers. Email, chat and voice communication also are possible at a fraction of the cost of calling via a telephone line.

Slide 18: What are the Disadvantages of Using Computers for Data Processing?

Note
The computer is dependent on people, hardware, software, procedures, and other factors such as availability of electricity and upgrade costs. It is also prone to loss of data due to fluctuations in electricity and virus infection. When using computers make sure to back-up daily.

Slide 19: What are some General Trends in Computers?

Tip
Emphasize the rapid developments in ICTs. In general discuss the decreasing size but increasing capacity of computers as contrasted with the increasing size and capacity of software. The effect of these developments on cost is: hardware cost is decreasing but software cost is increasing. Remember to mention Moore’s Law and its impact on the upgrade of computer systems.

Slides 20-21: What are some General Trends in Hardware/Software?
**Tip**

Provide specific examples from the Internet. Include open-source software such as Linux, phpMyLibrary, MySQL. The web sites for these software packages are provided in Module 2.

**Slide 22: Conclusion**

**Activity 1.2.2**

Before concluding the lesson, ask the students to state their opinion about the application of ICTs in libraries in their country.

**Note**

Emphasize that computers are reliable and efficient tools for data processing and information retrieval. There are advantages and disadvantages in using them. However, the efficiency of these tools is dependent on hardware, software, database design, the user and other factors. It is also prone to loss of data due to fluctuations in electricity and virus infection. However, there are ways of backing-up data and ensuring the security of the system.

**Assessment**

**Assessment 1.2**

**Answer one of the following:**

1. (10 points) Is an automated teller machine (ATM) a computer? Prove your answer by discussing the functions and capabilities of the ATM in terms of the following aspects:

   - Its general characteristics
   - Its input function(s)
   - Its processing function(s)
   - Its output functions(s)
   - Its storage function
2. (10 points) If the library where you are working is not yet using computers, identify at least three services or functions that can be improved through the proper use of computers. Explain how these services or functions can be improved. On the other hand, if the library where you are working is already using computers, identify at least three functions and services that were improved with the introduction of computers. Compare how these functions or services were performed before and after computers were introduced.

End of Lesson 2 of Module 1
Module 1
Introduction to Information and Communication Technologies

Teacher’s Guide

Lesson 3: What are the Hardware Components of a Computer?

Introduction
The lessons are presented to the students as PowerPoint slides as shown in the title slide below. The Teacher’s Guide will provide you with information and tips on how to explain each slide. It will also provide you with exercises/activities that you can ask the students to do.

Tip
Establish a rapport with the students by asking them to answer the question on the title slide. This will serve as a motivation activity by letting them know that you are interested in what they know and that you give importance to what they have to say. This will also encourage them to actively participate in the lecture / discussion. Their answers in turn, no matter how brief they are, will help you gauge their understanding of the subject matter. There is no need to discuss their answers at this point.
Computers are machines made up of different parts. The physical components are called hardware. Knowledge of these physical components and their functions will enable you to understand how the parts of a computer relate to one another. It will also help you troubleshoot when you meet problems in using computer systems.

Inform the participants that this module aims to provide adequate knowledge about hardware. Use this slide to encourage students to share experiences about hardware use.

Finish the PowerPoint presentation before doing the hands-on activity. This will give the students plenty of time to identify and experience using several hardware components of a personal computer system. As much as possible show / point to the actual object or provide pictures of the hardware being discussed.

Hardware is the physical component of a computer system. It refers to the electromechanical parts and devices that make up a computer. If you can touch it, then it is hardware of the computer system. Generally, hardware is categorized according to which of the five basic computer operations it performs:
• Input - data is captured electronically into a form that can be processed by a computer;
• Processing and memory - microprocessor, primary memory and other processing devices used for manipulating data into information;
• Output - production of processed information into a usable form;
• Secondary storage - data, information and programs are stored in computer-processable form;
• Communications - enables the transfer of data from one place to another and facilitates resource sharing.

Slide 6: What are Input Devices?

Note
Input hardware is used to enter data into a computer. Data can be directly encoded using the keyboard, or read through scanners and pointing devices like the mouse. Input hardware convert data, such as text, images and drawings into a form that a computer can understand and use. For example, in libraries, the most commonly used input hardware in encoding bibliographic information of books and other materials are keyboards, barcode scanners for reading barcodes and patron IDs, and flatbed scanners for images and other documents. Other input devices are CD-ROM/DVD drives, microphones, cameras, etc. Some examples of input devices are shown in slide 7.

Slide 7: Input Devices

Tip
Demonstrate how input hardware works by using the keyboard, mouse, and other input devices such as scanners. Briefly talk about the relationship between input and output devices and why some are both input and output devices.

Note
Keyboard
The keyboard is probably the most common input device in use today. A keyboard allows the user to type numbers and characters for input. These
inputs are then translated into a format that can be interpreted by the computer.

Pointing devices
Pointing devices are used as input devices by directing or pointing the cursor at data, and activating specially defined areas of the output displayed by the monitor. The area being pointed to is identified by the pointer -- a small rectangular object or a graphical arrow head that is included as part of the output. When a pointing device is moved, the pointer also moves across the screen. Pointing devices include the mouse, the track ball, the joystick, the digitizing tablet and stylus and the touch screen.

• Mouse
With its tail-like cable and small mouse-like body, the mouse is considered the most common pointing device. In the case of a mechanical mouse, underneath the device is a ball that rolls when the mouse is moved. The movement of the ball is then converted to screen coordinate values, which are used to position the mouse pointer on the screen. Alternatively, the mouse may employ optical technology to convert mouse movement into screen coordinates. A mouse is typically equipped with two to three buttons, which are activated by depressing any of the buttons with your finger.

• Trackball
The trackball is similar to the mouse in terms of function. However, the roller ball is placed on the top of trackball and not on the bottom. To generate movement, only the ball is moved while the trackball remains stationary. This device allows for more precise movements because the roller ball is moved by the index finger.

• Joystick
The joystick was patterned after the device used to maneuver planes, spaceships, and the like. Since this device can react to sudden jerky movements, it is a preferred input device for many computer gamers.

• Digitizing tablet and stylus
Digitizing tablets are specially designed flat surfaces capable of recording the movements of a pen-like device called a stylus. The movements of the stylus are transmitted to the computer monitor. This device is typically used to input drawings and figures, yet it can also be used to collect handwriting and signature specimens.

• Touch screen
The touch screen is a computer monitor that is covered a by thin layer of plastic film. This thin layer of plastic film is capable of detecting pressure generated by the touch of a finger. Touch screens act as input devices by
determining the area where the screen was touched by the user. They are commonly used in information kiosks found in hospitals, libraries, and other public places. They are also used to record orders in restaurants and accept airline ticket reservations.

**Scanning devices**

Scanning devices or scanners are used to convert images such as pictures and text into digital images that can be directly manipulated by the computer.

- **Image and Text Scanner**
  
  Image and text scanners are classified into flatbeds or hand-helds. A flatbed scanner is typically used for flat surfaces such as pictures, office documents, and books. Using a flatbed scanner is similar to using a photocopying machine, wherein the object to be scanned is placed on a glass surface with a camera-like device located below the glass.

- **Barcode Scanner**
  
  Another type of scanner is the bar code scanner used to read the series of vertical black lines and numbers printed on the labels of grocery items and other consumer goods, books and journals.

**Microphones**

A microphone is used to accept and convert audio input into digital data. This enables the computer to work with audio data. In fact, there are software applications that can convert audio input to text with a high degree of accuracy. These applications are useful for physically disabled individuals who can work with the computer through voice commands.

**Slide 8: The Inside and Outside of the Computer**

**Note**

Hardware devices are used to process data that has been input. The result of processing is then passed on to the output or storage devices.

The processor and the main memory devices are the brains of the computer. Housed in the system unit, the processor, also known as the CPU (central processing unit), interprets and executes instructions while the main memory serves as the computer's "work space". The processing power of a computer largely depends on the speed of the processor and size of its main memory. A faster processor leads to faster execution of instructions, and a bigger memory provides a bigger "work space" so that more data can be processed at one time.
The processor is housed inside the system unit. The system unit or the system chassis is used to house the majority of processing hardware. The system unit comes in all shapes and sizes.

**The System Housing**
Examine the front side of a desktop computer system unit. It is designed to accommodate peripheral devices such as CD-ROM drives, disk drives, and flash drives. The system unit of a typical desktop computer can accommodate up to four peripheral devices.

Aside from these rectangular slots, several push buttons are also found in the front of the system unit. These buttons are typically round or oval-shaped. The most important among these buttons is the **power** button, which is used to switch the computer on and off. If you use this button to switch on the computer, this process is called **cold booting**. We will discuss more about the booting process when we talk about operating systems. Another useful button is the **reset** button. You use this button to restart the computer without cutting off the electrical supply. The process of using this button to restart the computer is called **warm booting**. Another characteristic of the front side of the system unit is the presence of **led** (light-emitting diode) indicator lights. These lights are used to indicate hard disk activity, the status of the turbo setting, and the power supply status of the computer.

The rear of the system unit contains the ports or sockets. This is where the cables of peripheral devices are connected to the processing hardware. Some ports are round, some have pins, while others have holes. The ports with holes are called, pardon the term, **female ports**. You might have guessed that the ports with pins are called **male ports**. Aside from having holes or pins, ports are also classified according to the number of pins or holes. Some ports have 7 or 9 pins or holes, some have 15, while others have 25 pins or holes. Connecting a peripheral device is easy, it's like playing with a toddlers' shape sorter toy -- plug it into the port where it fits, that is, a hole to a pin and vice versa. If you have a 9-pin connector, then you must have a 9-pin port. Ports are also classified according to how they transmit data. Ports, which transmit one bit at a time, are called **serial** ports. To get the idea, it can be compared to a car park where the entrance or exit can only accept one car at a time. On the other hand, a **parallel** port transmits data in groups of eight bits. It is like a car park with an entrance or exit that can accommodate 8 cars at the same time. Parallel ports are called **LPT** ports in computer terminology while the serial port is known as the **COM** port.

The mouse is an example of a peripheral device that makes use of a serial port. On the other hand, the printer is an example of a device that is connected via a parallel port.

More recently these kinds of ports have been replaced by USB ports into which can be plugged many different devices including the mouse, external hard
disks and flash drives.

Aside from ports, the rear of the system unit also contains the socket for the computer's main power line and the power connection of the computer monitor. For some computers, the power connection for the monitor is not present because the monitor is directly plugged into the main power supply outlet.

Aside from these sockets, other jacks may be present for audio speakers and microphones. In addition, a small fan for the power supply of the system is also visible. One word of caution, do not, under any circumstance, tinker with this fan and the power supply in general. Doing so can result in a fatal electric shock.

**Inside the System Unit**

The inside view of the system unit is the most interesting because this is where you can see the various components of the computer's "brain". Since looking at the computer's inside can be very confusing, let us discuss the components one at a time.

The peripheral bays are used as holding areas for hard disk drives, CD-ROM drives, and the like. Screws on both sides secure these devices. The rectangular box on the upper-left corner is the power supply. On the left side of the picture, you will see the other view of the various types of ports. The biggest area of the system unit is occupied by the motherboard. Different peripheral devices are connected to the motherboard through flat bus cables. The rectangular-shaped box located near the lower right corner of the power supply is the central processing unit housing. Attached perpendicularly to the motherboard is an assortment of expansion cards. The smaller, round and colored cables are responsible for supplying the power requirements of the different hardware devices inside the system unit. With this brief introduction, you are now ready to learn about the different processing hardware devices.

The motherboard is a flat circuit board that is used to house the various processing hardware components such as the Central Processing Unit (CPU), the Random Access Memory (RAM), the Read-Only Memory (ROM), the co-processor, the expansion cards, to name a few. To enable the different processing devices to communicate with each other, special circuits are burned into the board. This circuitry acts like a highway for transporting data from one device to the next.

**Slide 9: What is the Processor?**
Note

The processor is the device that interprets and executes instructions. It is the brain of the computer. The faster the speed of the processor, the faster the execution of instructions. In a computer-based information system, the CPU controls and manipulates data into information.

In a PC (personal computer), the CPU is a very small single "chip" called a microprocessor, with electrical circuits printed on it. It is mounted to the system board, called the motherboard, together with the other necessary components. Types of processors vary according to their manufacturer, clock rate (execution of instruction per second) and processor generation.

Examine the inside of the unit and look for the following:

*The Central Processing Unit (CPU)*

The CPU is called the brain of the computer because this is where the processing takes place. It has two important components, the *Arithmetic Logic Unit* (ALU) and the *Control Unit* (CU). The ALU performs the needed operations such as addition, subtraction, multiplication, division, comparisons, and logical operations. On the other hand, the CU is responsible for interpreting and executing the instructions stored in programs. It also coordinates the activities of all other devices within the system based on the instructions of the running programs. The circular object that you see is actually a small fan used to aid in cooling the processor. Some examples of CPUs are:

- Intel Celeron D 336 (2.8) LGA 775
- Intel Pentium 4 506 (2.66) LGA 775
- Intel Pentium 4 630 (3.0) 2MB HT LGA 775

**Slide 10: Other Components inside the Computer Housing**

**Note**

*Bus Cables*

Flat, usually gray-colored cables which are used to connect peripheral and storage devices such as hard disks, disk drives, CD-ROM drives, and the like to the motherboard. These cables are used to move data and instructions to and from the processing devices located on the motherboard.

*Expansion Cards and Slots*

If you take a closer look at the motherboard, you will see several smaller circuit boards connected perpendicularly to it. These boards are known as
expansion cards and the rectangular slots where they are placed are called expansion slots. As its name indicates, an expansion card is used to expand the existing capabilities of the computer system.

Power Supply
If you take a look at the rear of the system unit, you will see a small fan and two plugs located within this rectangular box. The fan that you see is part of the system's power supply unit. The power supply is responsible for providing the power requirements for almost all components of the computer system. The fan is used to remove the hot air generated by the power supply and other internal components. Putting objects inside the power supply can lead to an electric shock. In addition, you are not advised under any circumstances to open the power supply. Power supplies do not contain serviceable parts. This means that if it becomes defective, the whole unit will have to be replaced.

Slide 11: What is RAM or Memory?

Note
The RAM or Random Access Memory is also called the main memory. During processing, the RAM is used as a temporary storage area for data and instructions. Since it is directly connected to the motherboard, data and instructions can be stored and retrieved at very high speeds. One distinguishing characteristic of RAM is that it is volatile in nature. This means that whenever the computer is shut down, whatever is contained inside the RAM is erased.

Memory capacity is important because this is where data and programs are stored while they are active, thus bigger memory means bigger workspace. Today memory capacities of 512 MB PC 400 DDR are desired.

Tip
Visit this article on computer memory - How Computer Memory Works [http://www.howstuffworks.com/computer-memory.htm]

Slide 12: The RAM or Memory
Slide 13: What is Read Only Memory?

Note

Aside from the RAM, the computer also has a ROM (Read only memory), which is used to store the boot program, and other low-level information that enables the computer to start up and to recognize its hardware parts.

The ROM or read-only memory contains the basic information needed by the computer system during the booting process. Just like the RAM, it is directly connected to the motherboard. However, unlike the RAM, the contents of ROM cannot be erased or removed. This means that even if the computer system is turned off, the contents of ROM will not be affected. One important component of a computer system stored in the ROM is the system **BIOS**. The acronym BIOS stands for **Basic Input Output System**. The BIOS is used during the boot process to check if all vital components such as the monitor, the keyboard, memory, and disk drives are present and working properly. In addition, the system BIOS is responsible for locating and loading the operating system.

Slide 14: Output Devices

Note

**Output Devices**

After the data has been processed into information by the processing hardware devices, the information must be translated into a format that can be understood by a human user. This is accomplished by output devices. They are classified according to the type of output generated. Output devices can generate either soft copy or hard copy output. The first classification refers to the devices whose output we can only read or hear, or is intangible. The monitor and speakers are examples of such devices. Meanwhile, hard copy output refers to something tangible such as a piece of paper. The printer is an example of an output device that generates a hard copy output.

Slide 15: Examples of Output Devices
Main output devices are monitors for displaying the output and printers for producing a permanent copy.

**Monitor**

If the keyboard is considered the required input device for today’s computer systems, the monitor is considered the required output device. You can have a computer system without a printer but it is difficult if you do not have a monitor. In fact, the operating system will not allow the boot process to continue if it finds that the system’s monitor or keyboard is missing. The monitor is important because it allows you to see the results of your actions. For example, if you press the key labeled A, the monitor will display the letter A. Since its output is in soft copy, modifications or corrections can be easily performed.

Computer monitors are generally classified into two categories: CRTs and flat-panel displays. The acronym CRT stands for Cathode Ray Tube and it is the same technology used for televisions. CRT monitors are the most common types of monitors for many computers because of their low price. However, they have limitations in terms of their bulky size and heavy weight. Because of these limitations, a new type of computer monitor was developed for portable computers such as laptops. This is known as a flat-panel display. Instead of a CRT, this type of display utilizes a special substance placed between two plates of glass. This technology eliminates the need for a bigger housing for the monitor, as in the case of CRT monitors.

**Printer**

Just like the monitor, the printer is also an output device. However, the printer is used to generate hard copy output. Printers are classified into two types: impact and non-impact printers.

An impact printer is equipped with a printer head with tiny pins. These pins are used to strike an ink ribbon, which in turn transfers ink to paper. This is similar to the method used in typewriters. Impact printers can generate the different characters by changing the combination of pins that strike the ink ribbon. The heads of impact printers actually touch, or impact the ink ribbon to generate hard copy output, hence the name impact printers. A very popular example is the dot-matrix printer.

On the other hand, a non-impact printer makes use of laser technology, heat, or chemicals to generate hard copy output. Unlike impact printers, non-impact printers have no printer heads with tiny pins. The non-impact printer's printing mechanism makes no contact with the paper. Laser printers and ink-jet printers are kinds of non-impact printers. Examples of such printers are the Epson C45 and the HP Deskjet 1010.
Speakers
Aside from the soft copy output generated by the computer monitor, a computer can also generate soft copy output in the form of sound, using audio speakers.

Slide 16: What are Storage Devices?

Note
A computer is capable of storing and retrieving data. This is made possible by secondary storage devices that raise an important aspect: storage capacity. Storage capacity is measured in bytes (a single byte is equivalent to one character).

Slide 17: Examples of Storage Devices

Note
There are different kinds of storage devices. Among these are optical devices (CD-ROM, DVD), and magnetic devices (tapes, disks). The floppy disk is an inexpensive, portable storage device. Inside the square plastic casing is the floppy disk's storage area, which is made of mylar. A device called the disk drive is used to retrieve and store data on to a floppy disk. Floppy diskettes are seldom used these days. The most common portable storage device today is the flash disk (USB).

Hard Disk
The hard disk combines the storage medium, called platters, and the storage and retrieval device into one hermetically sealed unit. Hard disk drives have very large storage capacities as compared to floppy disks. The hard disk drive is typically placed in the system unit's peripheral bays and connected to the motherboard through bus cables. The platters are mounted on a single rotating central axle. Once the computer is turned on, these platters will rotate at very high speeds. A read/write head is used to retrieve and store data on to the platters. Today disk drives of 100 MB capacity are common.

Drive space can be expanded by attaching an external (and portable) hard disk to the computer via a port.
CD-ROM
The acronym CD-ROM stands for Compact Disk-Read Only Memory. It is a storage device with a capacity of approximately 655 MB. Just like audio compact disks, CD-ROMs are written to only once. Since it is relatively cheap, it is now the standard distribution media for many software applications. In order to retrieve data from a CD-ROM, you must have a CD-ROM drive. On the other hand, if you are interested in storing data to a CD-ROM, you must have a device called a CD-Writer.

CD-R and CD-RW
Other types of optical storage devices like CD-Rs and CD-RWs allow you to record and rewrite data in a blank compact disk. Data on CD-ROM cannot be edited since the disk is a read-only medium. CD-R (CD-Recordable) are disks used to record data. Data recorded in a blank CD-R can not be rewritten; if deleted the space used to store the data is no longer recovered. Data written in CD-RW (CD-Read Write) can be erased and rewritten without a lost of storage space just like a hard disk drive. However, data stored on a CD-RW can only be read by multi-read CD drives like CD-RW devices and other compatible devices with the corresponding software.

DVD
A DVD (Digital Versatile Disk) is an optical disk that shares the same overall dimensions as a CD, but has significantly higher storage capacities - a minimum of 4.7GB (enough for a full-length movie) to 17GB (double sided). DVD drives are backward-compatible with CD-ROMs. Two competing technologies using different standards for a rewritable DVD are currently available: DVD-RAM and DVD+RW. Both allow data storage and recording digital video onto 4.7 GB DVD disk just like a CD-RW.

Tape cartridge
A tape cartridge resembles an audiotape. This device is used for backups. A backup refers to a duplicate copy of a program or data set. This extra copy is your insurance against system crashes. To retrieve and store data to a tape cartridge, your computer must be connected to a tape drive.

Slide 18: Communication Hardware

Note
Communication hardware, also called networking devices, are used to extend the processing capabilities of a computer system by providing a means of transferring data and applications from one computer system to another.
Communication hardware is used to link computers to communication networks like the Internet that allow electronic transfer of information anytime, anywhere.

**Computer Network**

A computer network is defined as a group of computers and other support devices connected via a communications channel. Before discussing the more technical aspects of computer networks, what benefits are derived from computer networks?

**Shared Programs and Data**

The ability to share programs and data is probably the primary reason why computer networks are established in the first place. Through a computer network, several computers can share access to a single copy of a particular software. There is then no need to buy multiple copies of the same software, which can drastically reduce costs associated with software acquisition. Aside from sharing software components, expensive hardware components such as laser printers can also be shared by several users.

In addition to sharing hardware and software components, a networked configuration also allows data sharing. In most instances, one computer acts as the server, or a central data repository. Other computers with a connection to the server can access the data stored in it. For instance, in a library system, a server computer can act as an electronic card catalog, which can be accessed by other computers situated in different areas of the library. Meanwhile, library users can use these computers to look for a particular item in the library's collection. With a setup like this, only a single copy of the data is maintained, which reduces the demand for secondary storage space. More importantly, data redundancy or the proliferation of several copies of the same data is avoided. Having redundant data around the workplace must be avoided because updating several copies of the same data is tedious. What can make matters worse is the fact that some of the copies may not be updated and may be used as a basis for making inaccurate decisions.

**Improved Communication**

Aside from program and data sharing, a computer network can be used to facilitate communication. Since data is sent at electronic speeds, a message can be sent through a network and it will reach its destination in a matter of minutes. A very popular communication tool, which makes use of computer network facilities, is the electronic mail or e-mail. E-mail is in many ways, similar to conventional postal mail. You still need addresses, messages, and mailboxes. However, all of these components are now in electronic format and everything is performed electronically, from composing the message to sending the message. Today's e-mail can send and receive text, images, video, and audio messages.
Slide 19: Communication Channels

Note

A communication channel is used in transporting data from one point to another. To link one computer system to another computer system, different types of communication channels are used. In fact, in many instances, data passes through different types of communication channels before it reaches its destination. Communications channels are classified according to the type of link established. A wired link makes use of wires and cables to establish the connection. On the other hand, a wireless link is established through the use of satellites and other communication devices.

Wired links

- **Twisted-Pair (TP) Wires**
  This type of wired link refers to the high-grade version of wires used for telephone connections. The twisted-pair wire is composed of two strands of copper twisted around each other and coated with a plastic layer of insulation. It is called twisted-pair wires because it is made up of two sets of wire pairs. Hence, there are four wires in all. By the way, the twisted-pair cables for telephone lines can also be used for data transmission.

- **Coaxial Cable**
  Aside from being used for cable TV connections, coaxial cable or coax is used as a communications channel for computer networks. The coaxial cable contains two conductors. It contains a single strand of wire in the middle that is insulated with a plastic coating. The other conductor provides additional insulation against outside interference. Coaxial cable is capable of both baseband and broadband transmissions. In baseband transmissions, the coax is used to carry a single, high-speed signal. On the other hand, the coax cable is used to carry multiple signals at different frequencies with broadband transmission. The latter type of transmission is used for cable television transmissions.

- **Fiber-optic cables**
  Instead of transmitting data in electronic format, fiber-optic cables make use of a thin strand of glass to transmit pulsating beams of light. One advantage of fiber-optic cable is its transmission speed because light travels faster than electricity. In terms of cost and handling, fiber optic cable is more expensive and difficult to handle as compared to other media.
Links without Wires

Wired links are ideal for enclosed areas such as a building, a town, or a city. However, establishing wired links over mountain ranges and oceans is more difficult. For establishing communications links over wide geographical areas with diverse topologies, wireless links are the best bets.

- **Microwave Signals**
  Microwave signals travel in straight line from sender to receiver. There is not much of a problem when the distance is relatively short. However, when the destination is on the other side of the globe, a message traveling in a straight line will have no way of reaching its destination because the Earth is an oblate spheroid or in simpler terms, round. To solve this problem, repeater stations are used to pass the microwave signals until it reaches its destination. Through these repeater stations, the signal is transmitted from one station, and at the point where the terrain begins to curve another station receives the signal and re-transmits the same signal to the next station. The same process is repeated until it reaches the station near to the destination. As you can see, a relatively simple solution was used to overcome a seemingly difficult problem.

- **Communications Satellites**
  Since microwave signals travel in a straight path, someone came up with the idea of placing a man-made object, a satellite into orbit to bounce signals back to Earth. However, since a satellite in orbit can only cover about one-third of the Earth's surface, three satellites are made to follow a synchronized orbit so that at any given time and place, a satellite would be there to bounce the signals back to Earth.

Slide 20: Conclusion

**Note**

Hardware is the physical parts of the computer. Hardware includes the components that can be touched. Each component performs a specific function that contributes to the performance of the whole system. However, to make the computer system work, it needs software. Software sets the rules and procedures for the hardware to do what it has been instructed to.

Hardware is composed of input, output, storage and processing devices. In addition it has other components that allow for the devices to be linked together. Hardware also includes the power supply and the housing.
Activities

Activity 1.3.1

Do the following hands-on exercise.

1. Check if the hardware is connected to an AVR or a UPS that is connected to a power supply.
2. Turn on the AVR or UPS.
3. Switch on the computer by pushing the button marked power. Wait for the computer to finish “booting up.”
4. View the computer’s basic system information flashed on the screen while booting up, such as the operating system, processor type, installed RAM (random-access memory) etc.
5. View the computer’s desktop configuration: date & time, volume settings, desktop display options (e.g. background options, screen settings, screen saver options etc.).
6. Use the mouse to shut down the computer.
7. Close the AVR or UPS.
8. Remove the plug from the wall socket.

Assessment

Assessment 1.3

You are asked to buy a computer for the library by your director, what specifications will you recommend and why (10 points).

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<thead>
<tr>
<th>COMPONENT</th>
<th>SPECIFICATIONS</th>
<th>REASON</th>
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<tbody>
<tr>
<td>Processor</td>
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<td>Hard Disk</td>
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<td>RAM</td>
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<td>Monitor</td>
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<td>CD-ROM/DVD Drive</td>
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<tr>
<td>Printer</td>
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End of Lesson 3 of Module 1
Module 1
Introduction to Information and Communication Technologies

Teacher’s Guide

Lesson 4: What are the Software Components of Computers?

Introduction
The lessons are presented to the students as PowerPoint slides as shown in the title slide below. The Teacher’s Guide will provide you with information and tips on how to explain each slide. It will also provide you with exercises/activities that you can ask the students to do.

Slide 1. This is the title slide for lesson 4.

Tip
Establish rapport with the students by asking them to answer the question on the title slide. This will serve as a motivation activity by letting them know that you are interested in what they know and that you give importance to what they have to say. This will also encourage them to actively participate in the lecture / discussion. Their answers in turn, no matter how brief they are, will help you gauge their understanding of the subject matter. There is no need to discuss their answers at this point.
Slide 2: Rationale

**Note**

Computers are machines made up of different parts. The physical components are called hardware. The non-physical components are called software. Both are needed in using computers for specific applications.

**Tip**

Inform the participants that this module aims to provide adequate knowledge about software. Use this slide to encourage students to share experiences about software.

Slide 3: Scope

Slide 4: Learning Outcomes

**Note**

Hands-on exercises on Windows and MS Word, Excel, and PowerPoint are provided with this lesson.

Slide 5: What are the Types of Software?

**Note**

Software refers to the set of instructions or rules that determine how data is to be processed. In contrast to tangible hardware, software is the intangible component of a computer system. It can also be defined as a series of step-by-step instructions used by the computer system to carry out a certain task, such as adding two numbers, or saving a file to the hard drive. There are different kinds of software, each one designed to perform a particular
task or a group of related tasks. In general, however, software is classified into two broad categories: system software and applications software.

**Tip**

The hands-on exercises are designed to familiarize students with the different types of software through the use of system software (Windows), and some application software (MS Word, Excel, and Power Point).

**Slide 6: Operating System**

**Note**

System software is responsible for performing the basic operations of a computer system. It is further sub-divided into two smaller categories: operating systems and utilities.

**The Operating System**

The operating system software is the so-called manager of the system. It is responsible for making sure that every component of the system is doing what it is supposed to do. In addition, it is also responsible for allocating resources when and where they are needed, as well as releasing the component when it is no longer needed. Knowing how to use an operating system is very important because it enables you to communicate with the hardware components of the computer system. In fact, for many computer users, operating systems were the first software programs that they learned. The operating system:

- Controls and manages peripherals.
- Retrieves, loads, executes, and stores applications programs.
- Retrieves and stores data.
- Acts as an interface between the user and the computer system.

**The Shell**

The shell of the operating system acts as an interface between the user and the computer. It represents the visible aspect of the operating system. You issue commands and get responses from the operating system through its shell.

There are two types of shell: the command line interface, and the graphical user interface (GUI). In an operating system with a command line interface, you communicate with the system by typing a series of commands in an input.
area called a prompt. For some users, using the command prompt is difficult because there is a need to memorize commands. The Disk Operating System (DOS) is a popular example of an operating system with a command-line shell.

On the other hand, an operating system with a graphical user interface (GUI) makes use of pictorial representations called icons and menus to represent the commands needed to communicate with the operating system. A GUI-based operating system minimizes if not eliminates the need to memorize commands. The Windows operating system is an example of an operating system with a GUI-based shell.

The Kernel
If the visible part of the operating system is called the shell, its invisible counterpart is called the kernel. It is made up of software components responsible for performing the different functions of the operating system.

Booting
Every time you open the computer, one of the first things the computer does is to load the operating system to the main memory or RAM. Once the operating system is loaded into the memory, it takes over the task of managing the resources of the computer system such as checking whether the basic components, like the keyboard and monitor, are present. This important process is called booting and comes from the name of the program used to load the operating system, the bootstrap loader. Whenever you open the computer using its power button, the process is called cold booting. On the other hand, if you use the Reset button or the <ALT><CTRL><DEL> key combination to restart the computer while it is already open, you are warm booting the computer.

Multitasking
Multitasking is the capability of some operating systems, such as Windows, to simultaneously perform two or more tasks. This means that while you are printing a document, you can, for example, work on another document or play a computer game. Although the tasks appear to be performed simultaneously, they are actually interleaved, that is the operating system divides the processing time among the tasks to be performed. For example, it will process the document to be printed for a quarter of a second. While the document is being printed, it attends to the document that you are working on or on the game that you are playing. Since multitasking is performed at very high speeds, it becomes virtually unnoticeable.
**Note**

DOS or the Disk Operating System was a very popular operating system for desktop computer systems. You interact with DOS by typing commands at the command line or DOS prompt. For example, if you want to delete a file, you must type the command DEL. If you want to copy a file, you must type COPY. Since there is a need to memorize many command names, some people find interacting with the computer through the DOS prompt difficult.

**Slide 8: Microsoft Windows**

**Note**

Microsoft developed a new operating system with a graphical interface called Windows 3.11 running in a DOS environment. Due to the wide acceptance of the GUI, Microsoft developed Windows 95. This operating system incorporated all of the easy-to-use features of operating environments with its own set of new features such as: easy access to networks; the ability to work with long file names; and plug-and-play features. Unlike its predecessor, Windows 3.11, it is no longer launched from another operating system such as DOS. On the contrary, the DOS command line interface is now included in Windows95 as another application. The current versions are Windows 98, Windows 2000, Windows XP and Windows Me.

**Slide 9: Other Operating Systems**

**Tip**

Visit the Microsoft web site to know more about its operating system. You should also visit the sites of other operating systems.

**Note**

OS/2

Operating System 2 is International Business Machine's (IBM) entry into the operating system market for desktop computers. Just like Windows, it also has a graphical user interface as its shell. OS/2 can be easily configured to communicate with other types of computers such as portables and mainframes.
In addition, its multitasking capabilities are considered more advanced than other operating systems. However, Windows is still considered the most widely used operating system for desktop computers.

**UNIX**

UNIX is not an acronym, but rather a name given to an operating system developed by two programmers, Ken Thompson and Dennis Ritchie. Unlike most operating systems which are computer-specific, that is they are used to run in a particular brand of computer, UNIX was designed to run on different brands of computers or platforms. UNIX has different flavors and some are also proprietary. An open source UNIX is LINUX which also comes in different flavors.

**The Macintosh Operating System**

The Macintosh Operating System is used to run Macs or Apple Macintosh computers. Just like Windows, it is equipped with GUI shell. However, the Apple GUI is older than Windows. The GUI of these operating systems has made it very easy for regular users to communicate with the computer system. GUIs have made computers user friendly.

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### Slide 10: Utilities

**Note**

The second kind of system software is utility software. Utilities are used to support other software, such as operating systems and applications. Here are some examples of utilities.

- **Data Compression Software**
  Even with large hard disk capacities, the time will come when you have reached capacity or you need to transport data from one place to another. One way of maximizing the capacity of your storage devices is to use data compression software. To compress data, the software uses an algorithm or program to remove repeated elements, which reduces the disk space occupied. However, before you can use the compressed file, you must first uncompressed it, but don't worry, disk compression software products like *Pkzip*, *ARJ*, and *WinZip* are capable of compressing and uncompressing data.

- **Disk Management Tools**
  Disk management software is used to keep secondary storage devices in tiptop shape. *Scandisk*, an example of disk management software, is used to check the physical condition of storage devices. It can identify bad
sectors, or areas that can no longer store data. There are also disk management tools for defragmenting hard disk drives. Fragmentation occurs when portions of files are stored in different areas of the disk. To defragment a disk, portions of the files are moved and stored in contiguous areas. The storage space between fragmented files can then be used to store other data.

- **Anti-virus**
  These are programs designed to clean-up and protect the computer from virus software. Examples are Norton anti-virus and AVG.

**Slide 11: Applications Software**

**Note**

This type of software comprise programs designed to perform specific tasks for the end user such as working with text or word processing, accounting, playing games, managing the library operations such as cataloguing and circulation, communicating via e-mail and chat, e-banking, and a whole lot more. Here are some examples of applications software.

- **General purpose software**
  - Word processing – MS Word
  - Electronic spreadsheet – Excel
  - Presentation – PowerPoint
  - Database Management – MS Access, Oracle
  - Imaging/Graphics – Adobe Photoshop
  - Desktop Publishing – Adobe Page Maker

- **Specific applications**
  - Library management – Athena, Geac Library Solutions, Millenium, etc.
  - Accounting software
  - Architectural Applications – AutoCAD
  - Engineering Applications – CAM
  - Statistical Packages – SPSS

Many types of applications software on the market today are pre-packaged. They are bought right off-the-shelf. On the other hand, custom applications are developed for computing needs beyond the scope of packaged applications. They are usually developed to adapt to the requirements of a particular system and are developed by software development firms, which are also called software houses.
Note

Applications that are used for general tasks such as producing memos, letters, etc, are called general purpose office software.

Word Processing Software
As a librarian or an as information scientist, one of your many tasks is to prepare documents such as announcements, memos, and research findings. For this type of work, the applications software that will be most useful is the word processor. A word processor allows you to input, store, manipulate, and output text. It is considered the electronic version of a typewriter. It is preferred to a typewriter because corrections can easily be made on the electronic copy.

Electronic Spreadsheets
If the word processor lets you work with text, an electronic spreadsheet software program lets you work with numbers. Patterned after the paper-based spreadsheets of accountants, an electronic spreadsheet lets you store numbers in rows and columns of a two-dimensional matrix. It can also process these numbers based on your own formulas or the formulas within the program.

Presentation Software
Presentation software is primarily used to create electronic slides. Aside from creating electronic presentations, they also have the capability to generate speaker's notes, handouts, and presentation outlines. Everything you need to prepare for and make a presentation is included in this type of application.

Desktop Publishing Software
Desktop publishing combines text and graphics for creating near typeset-quality documents. It allows you to layout a document composed of text and images. To complete the process, a high-resolution printer, such as a laser printer, is used to generate a hardcopy of the document.

Graphics Software
Graphics software lets you manipulate and create images. With today's graphics software, you can edit pictures, and work with different types of visual textures, colors, styles, and effects, just to name a few.
Note

Software packages that are used for specific applications like library management systems, statistical applications, architectural and engineering applications, creating web pages, etc.

Browser Software
A browser is used to open files available through the Internet. You will learn more about the Internet in Lesson 6 of this Module. Internet Explorer and Netscape are popular brands of browser software. Since the Internet is now considered the largest and most popular source of information, the software used to access it is now standard for many computers.

Web authoring software
Web authoring software is used to develop materials for the Internet. This type of software is used primarily to develop HTML pages without having to know the HTML code or language. FrontPage and Netscape Composer are popular examples of web authoring tools.

CDS-ISIS
Software developed by UNESCO, CDS-ISIS (Computerized Database Services Integrated Set of Information System) is a text-based information storage and retrieval system. It was developed to provide for the information processing needs of institutions, particularly those that are based in developing countries. It has evolved into a library management system with the development of Web ISIS. CDS/ISIS is discussed further in Module 4.

Library Software
Library software is designed and developed to address the computing needs of libraries and other repositories of information.

Open Source Software
A lot of software for a variety of applications is available from the Internet free of charge. You can find such software by using the different search engines on the Internet.

Slide 14: Library Management Software
Note
Library software is designed and developed to address the computing needs of libraries and other repositories of information. It can be a single function system or an integrated library management system (although the former is no longer popular). Examples of integrated library management systems are: Athena, Geac Library Solution, Millenium, Follett, and many more. You can find descriptions of these software from the Internet.

Slide 15: Open Source Software

Note
There are many open source software that could be downloaded from the Internet. These include operating systems and application systems. Examples are:
1. Operating system — LINUX
2. File management system — Greenstone
3. Library management system — phpMyLibrary
4. General office application -- Open Office

Slide 16: What is a Computer Virus?

Note
It may come as a surprise to you, but not all applications are useful. Some were designed to disrupt the operation of other applications. One such program is called the virus. A computer virus, like a biological virus, is loaded into the computer system without you having any knowledge of its presence. A virus is a very small program, which can cause other programs to malfunction. To combat this problem, a utility program called an anti-virus, was developed to counter virus programs.

Virus
Generally a computer virus is defined as a program or a code that gains access without the users’ knowledge and/or perform actions not intended by the user, often damaging data and sometimes the whole system in the process. It is a self-replicating program whose main purpose is to propagate itself to as many places as possible. It propagates itself by modifying another program to include itself. It can only propagate itself by an act of a user of the system in
which it exists. For example viruses can be activated when opening infected files. They could be transferred from one system to another through diskettes, flash disks, e-mail, ftp, etc. The action that will trigger the virus to replicate depends on the type of virus that infected the file. Some security experts define viruses separately from worms, and Trojan horses.

**Worm**
A worm is a program propagating itself in a network of computers exploiting bugs and vulnerabilities of operating systems and application software or through guessing / breaking / stealing passwords to gain access to other machines in the network. Worms slow or shut down computer systems and networks due to their continuous and uncontrolled replication that consumes system resources which are needed to run “legitimate” tasks and operations. The worm’s capability to replicate itself without any action from the user differentiates it from a virus that needs user action in order to replicate.

**Trojan horse**
A Trojan horse masquerades as a useful or entertaining program but contains hidden functions that while running may destroy files or create a “back door” that will allow an intruder to access the system. The intruder can exploit the privileges of the user e.g. view, copy, or delete files, steal passwords, reconfigure the system or use it to attack another system. Trojan horses, unlike viruses and worms, do not spread by themselves but can be as destructive.

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**Slide 17: How can you protect your Computer and Data?**

**Note**

**Against a Virus**
- Do not run any program or open any file from untrustworthy sources.
- Always scan floppy diskettes and even CD-ROMs before using.
- Install a virus shield to automatically check diskettes, CDs and Internet files.
- Always get an updated version of a virus scan and cleaner.
- Always check you hard drive for possible infection, if you are connected to the Internet.

**Against other causes of data loss**
- Regularly back-up your system and your data. You may use CD-R, CD-RW, diskettes, tapes, or another hard disk for backing up your data and your system.
- Use firewalls, encryption and other security measures to protect data, computer systems and networks from intrusion and attacks through the Internet.
Slide 18: How are Programs Written?

**Note**

Programming languages are used to write programs. But before programs could be written a statement of the problem and future status of the system desired must be well defined. The systems development cycle is followed, in developing systems. It begins with systems analysis. The systems design follows the systems analysis. Here the relationships between entities are identified and systems design tools are used to come up with the right program logic for the system.

There are different types of programming languages. Programming languages are used because these are readable by the computer either as written or after compilation. The program written by the programmer is called the source code. The compiled program is called the object code.

Some programming languages used are:
- Low level languages--Assembler
- High level languages
  - BASIC and Visual BASIC
  - PASCAL
  - FORTRAN
  - C++
- Programming languages for the Internet
  - Perl
  - Java
  - HTML and other Web authoring tools

Slide 19: What are some Trends and Issues in Software Development?

**Note**

Programming languages are usually in English. Applications usually use the English language and the Roman alphabet. Problems arise when the user is non-English and/or is using non-Roman script.

Computers use character sets stored in binary codes. Different scripts use different character sets. Computers must know which writing system/character set they are dealing with. China, Japan and Korea have developed their own
character sets for their script.

Problems are met when the wrong character set is used in inputting and retrieving data, and in displaying information.

A possible solution is the use of Unicode. Unicode is a huge character set that includes all the world’s writing systems. The open source software, phpMyLibrary, can handle Unicode.

Library software will become more user friendly, have more sophisticated functionalities, be more web enabled, and more open. More open source software will be used in developing applications.

**Activity 1.4.1**

Do the following hands-on exercises. This will also be your assessment for this lesson.

**Use an operating system (Windows) (10 points)**

1. Open computer.
2. Click on the start button.
3. Choose Windows Explorer and click to open the application.
4. Explore the icons and what you can do with them.
5. Select and move desktop icons. Create a desktop icon.
6. Work with Windows. Recognize the toolbar, menu bar, status bar, scroll bar etc.
7. Reduce a desktop window, enlarge a desktop window.
8. Recognize the different parts of a desktop bar, toolbar, menu bar, status bar, scroll bar.
9. Insert a diskette on the diskette drive. Format the diskette.
10. Create a new folder. Label it with your name.
11. Open the folder by pointing the mouse on it and clicking. You will not see anything in it.
12. Open the "my documents" folder. Choose a file and drag the document to your folder.
13. Open the folder with your name on it.
14. Open the file in the folder by double clicking on it.
15. Save the file in your folder on to your diskette.
16. Drag your folder to your diskette.

**Organize files**

1. Examine a directory/folder. View some of the attributes: name, size, date when last updated, etc.
2. Re-name files and directories/folders.
3. Copy, Move, Paste, Delete files.
4. Make backup copies of data onto a diskette.
5. Use Cut and Paste functions to move files within directories/folders.
6. Use the Find tool to locate a file or a directory/folder.
7. Search by name, date created, file or directory/folder type.
8. Delete directory/folder.

Use a word processing software (10 points)
1. Open a word processing program by pointing and clicking on start, going to programs and then to Word.
3. Open a new file.
4. Compose a short description about yourself (about five sentences).
5. Save the file by pointing at the "file" on menu bar and clicking on “save as”. Give the file a name and save in the folder “my documents”.
6. Edit the file by using the icons or the menu under "format."
7. Print the file.
8. Save file onto a diskette.

Use other editing operations
1. Use Insert command.
2. Use Undo command.
3. Use Insert command.
4. Use Select command.
5. Use Copy, Paste, Move commands.
6. Use Search and Replace command.
7. Change fonts, use italics, underlining, and embolding.
8. Use alignment and justification.
9. Use lists.
10. Use templates.
11. Add headers and footers.
12. Create tables.
13. Import objects and resize.
14. Use spell check and grammar check.
15. Save file.
17. Prepare to print.

Use a spreadsheet (10 points)
1. Open a spreadsheet application.
2. Open an existing spreadsheet and make some changes and save.
3. Open several spreadsheets. Close all files one by one.
4. Create a new spreadsheet.
5. Enter numbers in a cell.
6. Enter text in a cell.
7. Enter symbols or special characters in a cell.
8. Enter simple formulas in a cell.
9. Use the Undo command.
10. Select a cell or range of adjacent or non-adjacent cells.
11. Use the Copy and Paste tools to duplicate cell contents in another part of a worksheet.
12. Use the Cut and Paste tools to move cell contents within worksheet.
13. Move cell contents between active worksheets.
14. Move cell contents between active spreadsheets.
15. Delete cell contents in a selected cell range.
16. Insert rows and columns.
17. Modify column width and row height.
18. Delete selected rows or columns.
19. Sort data.
20. Use basic arithmetic and logical formulas in a spreadsheet addition, subtraction, multiplication, and division.
21. Use the sum function.
22. Use the average function.
23. Format cells to display different currency symbols.

**Use a presentation software (10 points)**
1. Open a presentation application.
3. Create a new presentation.
4. Choose a slide layout form.
5. Choose background.
6. Add text.
7. Add an image from an image library.
8. Copy, Move, and Delete text.
9. Use the Copy and Paste tools to duplicate text, to duplicate a slide within the presentation or re-order slides within the presentation.
10. Delete a slide/slides within the presentation. Use formatting commands.
11. Re-size and move text box within a slide.
12. Import images/slides from other files.
13. Re-size and move an image in a slide.
14. Import other objects to slide.
15. Copy an imported object to a master slide.
16. Number the slides.
17. Print slides in various views and output formats.
18. Add/change transition/preset animation effects to slides.
19. View the slide show.
20. Close application.
Assessment

Assessment 1.4

The activities provided are also the assessment exercises.

End of Lesson 4 of Module 1
Module 1
Introduction to Information and Communication Technologies

Teacher’s Guide

Lesson 5: What Are the Components of a Network?

Introduction
The lessons are presented to the students as PowerPoint slides as shown in the title slide below. The Teacher’s Guide will provide you with information and tips on how to explain each slide. It will also provide you with exercises/activities that you can ask the students to do.

Tip
Establish rapport with the students by asking them to answer the question on the title slide. This will serve as a motivation activity by letting them know that you are interested in what they know and that you give importance to what they have to say. This will also encourage them to actively participate in the lecture / discussion. Their answers in turn, no matter how brief they are, will help you gauge their understanding of the subject matter. There is no need to discuss their answers at this point.
Slide 2: Rationale

**Tip**
Inform the participants that this module aims to provide adequate ICT knowledge and skill to the students to help them cope with the challenges of ICT and train other library and information personnel in their workplace or even throughout the region. This lesson is about networks.

Slide 3: Scope

Slide 4: Learning Outcomes

**Note**
The Teacher’s Guide provides notes and tips for the PowerPoint presentation that you will use in conducting the course.

Slide 5. What is a Network?

**Tip**
A comprehensive discussion of networks would require a lot of time and technical expertise in the subject matter. The following lesson is a very general discussion that will help the students to understand basic network concepts so that they can appreciate the roles played by networks in an information-based society.

**Note**
A computer network is defined as a group of computers and other support devices, which are connected via a communications channel. Before we discuss the more technical aspects of computer networks, let us first focus on the benefits derived from computer networks.
Shared Programs and Data
The ability to share programs and data is probably the primary reason why computer networks are established in the first place. Through a computer network, several computers can share access to a single copy of particular software. There is no need to buy multiple copies of the same software, which can drastically reduce costs associated with software acquisition. Aside from sharing software components, expensive hardware components such as laser printers can also be shared by several users.

In addition to sharing hardware and software components, a networked configuration also allows for the sharing of data. In most instances, one computer acts as the server, or a central data repository. Other computers with a connection to the server can access the data stored in it. For instance, in a library system, a server computer can act as an electronic card catalog, which can be accessed by other computers situated in different areas of the library. Meanwhile, library users can use these computers to look for a particular item in the library's collection. With a setup like this, only a single copy of data is maintained, which reduces the demand for secondary storage space. More importantly, data redundancy or the proliferation of several copies of the same data is avoided. Having redundant data around the workplace must be avoided because updating several copies of the same data is tedious. What can make matters worse is the fact that some of the copies may not be updated and may be used as a basis for making inaccurate decisions.

Improved Communication
Aside from program and data sharing, a computer network can be used to facilitate communication. Since data is sent at electronic speeds, a message can be sent through a network and it will reach its destination in a matter of minutes. A very popular communication tool, which makes use of computer network facilities, is electronic mail or e-mail. E-mail is in many ways, similar to conventional postal mail. You still need the addresses, messages, and mailboxes. However, all of these components are now in electronic format and everything is performed electronically, from composing the message to sending the message. Today's e-mail can send and receive text, images, video, and audio messages.

Slide 6: What are the Components of a Network?

Note
Hardware Devices Used For Networking Purposes
Aside from the different communications channels used to establish links
between networks, there are several types of hardware devices used for networking purposes. If the library you are working for has a network installed or is part of a bigger network, you will surely encounter these hardware devices.

**Network Interface Card**

A network interface card (NIC) is also known as a LAN card. It is an expansion card that contains the circuitry needed to connect a stand-alone computer to a network. An NIC is easy to differentiate from other expansion cards because it usually contains two ports, one for a coaxial cable connection and one for a UTP connection.

**Modem**

A modem performs a simple but very important function, it translates digital signals to analog signals and vice-versa. As mentioned in the introduction, the wires used for telephone connections are a widely used channels for computer networks simply because it's already there. There's one problem though, telephone wires can only work with analog data because voice data is sent in this format. In this regard, there is need for a device that can translate digital data to analog data, and vice-versa. This is the role played by the modem. In the sender computer, data is passed from the computer to the modem, where it is translated to analog data. The data in analog data is transmitted through the telephone wires until it reaches it destination. On the destination side, the analog data is received and converted to digital data by another modem. The converted data is then passed on to the destination computer. The process of converting digital data to analog data is called modulation. On the other hand, the process of converting analog data to digital data is called demodulation. The modem actually got its name by combining *modulation* and *demodulation*.

Instead of modems which involve dial-up connections at very low speeds (56 kbps), DSL or cable connections could be used.

**Routers**

A router is a device used to speed up message delivery within a network. A router is used to receive transmitted data and pass it on to its destination node using the fastest available route. Since data is transmitted efficiently, the network channel can accommodate more data transmissions.

**Transceivers**

A transceiver is a device that is capable of receiving and transmitting data signals.

**Bridges**

Just like a real bridge, a bridge device is used to connect two or more local area networks. It is capable of determining whether the data being transmitted is for the other network or for a node within the same LAN. If the data being
transmitted is for another node within the same LAN, the bridge prevents it from "crossing" to the other side. On the other hand, if it is for a node on the other side, the bridge will let the data transmission "cross" so that it can reach its destination. With this setup, the efficiency of the connected LANs is increased because unnecessary "crossings" are eliminated. A bridge is used to connect networks that use the same communications protocol. A protocol is defined as a predefined set of rules used by computers to communicate. A protocol is analogous to human languages such as Filipino and English.

**Hubs**
Similar to the hub of a wheel, a hub device is used to connect individual nodes and even several LANs together. This device is used as point of convergence for network wiring. Hubs are classified as either being passive or active. A passive hub simply forwards data transmissions. On the other hand, an active hub not only forwards the data transmission but it also amplifies or refreshes the data being transmitted. You can say that an active hub performs the function of a repeater station at the LAN level.

**Gateways**
Similar to a bridge device, a gateway device is used to provide a link or connection between two or more LANs. This time, however, the LANs that it connects use different protocols. The gateway not only directs traffic but it also acts as some sort of an interpreter at the same time. The translation part is essential in order for the nodes of the different LANs to communicate and exchange data.

**Activity 1.5.1**
Look at a network card and examples of cables and connectors for the different types of cables.

**Slide 7: What Are the Different Kinds of Networks?**

**Note**

**Local Area Network (LAN)**
A local area network or LAN refers to a computer network that is physically situated in a limited area such as one or more rooms or floors, or a building. The nodes (computers connected to the LAN) of the LAN are typically linked together by wired links. LANS could be:
- **Peer-to-peer**
  All computers on the network communicate and share resources directly with one another (see slide 9)

- **Client-Server**
  Consists of clients, computers requesting files or applications, and server(s) that provide applications and services to other computers (see slide 10).

**Wide Area Network**
As suggested by its name, a wide area network is used to connect entire LANs and individual nodes, which are situated in different parts of the world. Wide area networks are linked together by a combination of wired and wireless links. The Internet is a global wide area network.

**Tip**
Networks can be classified in different ways based on architecture, topology, communication medium used, geographical coverage, and in many other ways. However, types of networks are generally classified according to how information and services are provided - peer-to-peer and client-server.

**Slide 8: Peer-to-Peer LAN.** All computers on the network communicate and share resources directly with one another

**Slide 9: Client-Server LAN.** Consist of clients, computers requesting files or applications, and server(s) that provide applications and services to other computers

**Slide 10: Topologies of LANS**

**Note**
Networks can be laid out in a different logical layout or shape called a topology. The basic LAN topologies are:

- **Token Ring** – all computers are connected in a continuous loop
- **Star** – all computers are connected to a central server or a hub
- **Bus** – all computers are connected to a common channel

Computer networks, particularly local area networks, can be described in terms of how the individual nodes are interconnected to one another. In addition, a
network can also be described in terms of the roles played by individual computer units. These two characteristics of a computer network are described by its topology. Network topology refers to the configuration used to connect computers and other devices within a computer network. In a network, computers are either used as a node or a server.

A node is a generic term used to refer to any computer that is part of a network. In the context of a local area network, a node usually refers to a desktop computer equipped with an expansion card called a network interface card (NIC) and an operating system with networking capabilities.

On the other hand, a server is a computer in a computer network that is used to provide services needed by the other nodes. In general, servers are more powerful than other nodes in terms of RAM size, processing speed, and secondary storage capacity. A printer server is used to process the printing requirements of the entire network. Connected to the port (usually the parallel port) of the printer server is a heavy-duty printer such as a laser printer or a bubble jet printer device. Another type of server is known as a file server, which is used by the others to store and retrieve data and programs.

**Ring**
In a ring topology, the first node is connected to the last node, which forms a ring-like structure. Messages or data are passed on from node to node until they reach their destination node. A malfunction in the connection of one node can stop the entire network from functioning properly. However, a ring network is like a one-way road where data travels in a single direction. Hence, collisions are avoided in a ring topology. Slide 11 shows a network using the token ring topology.

**Star**
In a star topology, the nodes are connected to a server or a device called a hub. The server or the hub takes care of transmitting data from its sender to its destination without collisions. It can be said that the server or the hub acts as some sort of a traffic policeman for the computer network. In addition, if a node's connection fails, the other nodes will remain operational because the hub still maintains the interconnection of the other nodes. Slide 12 shows a network using star topology.

**Bus**
In a bus topology, individual nodes are connected to a main cabling system. This configuration is comparable to main secondary streets connected to a superhighway. The primary disadvantage of a bus topology is that a malfunction in the connection of one node can bring down the whole network. Locating where the malfunction occurred is a bit difficult because you have to check the connection of each node in a sequential fashion. Just like cars in a two-way superhighway, data in a bus network can be transmitted in both
directions. However, unlike in a superhighway, where collisions are avoided by providing separate lanes for each direction, data in a bus network make use of the same channel, which leads to collisions. When there are collisions, the data is resent until it reaches its destination without colliding with other data. Slide 13 shows a network using the bus topology.

**Hybrid**
A hybrid topology refers to a combination of these three topologies. This is typically used to connect individual local area networks located on different floors of the same building.

Slide 11: Token Ring

Slide 12: Star

Slide 13: Bus

Slide 14: What is a WAN?

**Note**
As suggested by their name, wide area networks are used to connect entire LANs and individual nodes, which are situated in different parts of the world. Wide area networks are linked together by a combination of wired and wireless links. The Internet is a global wide area network. WANs are made up of LANS and individual computers connected together. The connection could be wired or wireless.


**Note**
Applications derive from the ability of connected computers to communicate with one another. Some applications of networked services are:

- Business applications such as in Electronic Banking, Intranets, Airline Reservations, Telecommuting.
- Communications such as Voice Mail, Teleconferencing, Mobile Phones.
- Online information services such as accessing and sending documents.
• Internet applications such as Electronic Bulletin Boards, Electronic Mail, online access to information services.

• Academic applications such as Library automation, Remote access to databases, Online Registration, e-reserve.

**Tip**

Visit the following sites:
2. 3Com Small Business Learning Center. [http://learningcenter.3com.com/courscat.asp](http://learningcenter.3com.com/courscat.asp)

(All the courses on this page are available free of charge; all you have to do is register before taking the course).

**Slide 16: What are Intranets?**

**Note**

An intranet is a closed network accessible only to members of an organization. It differs from the Internet which is public domain. Intranets can use the Internet as a means of communication but built-in protocols prevent people outside the organization from using it. Both types of networks use the same protocols, standards, technologies and procedures but in an intranet permission is granted only to members of the organization for which it was created.

**Slide 17: What Is the Internet?**

**Note**

The Internet has many networks connected to it. It is a global network. It is open for access by many organizations. Its mission is not limited to one organization alone but caters to the entire world.

**Slide 18: What are some Trends and Issues confronting Networks?**
Many issues confront users of ICT. Among these are:

- **Security.** This refers to the security of data and the entire system since losses may occur due to viruses, fluctuations in electricity, hackers. Users are advised to observe procedures that will secure the system like regular back-up of the system, use of firewalls, etc.

- **Intellectual property rights (IPR) and copyright.** This refers to the rights of an individual to his or her intellectual creation. The IPR applies even if the work is not copyrighted. The copyright protects the creator of the work from unauthorized use of material.

- **Undesired information.** Users can be accessed by unauthorized information providers who may provide spam or even immoral information. There is software that protects users from such unauthorized access.

- **Privacy.** In a networked environment privacy is sometimes difficult to achieve. Remember that the net is not very secure. Do not use it for very private transactions.

- **Technological limitations.** Technology is always developing. Moore’s Law applies in technology development. It is expensive to keep up. Many applications use later versions of software that can run only on more powerful hardware.

### Assessment

**Assessment 1.5**

**Answer the following.**

(10 points) What is a computer network? Enumerate the benefits that can be derived by your library from the use of a computer network.

**End of Lesson 5 for Module 1**
Lesson 6: What Is the Internet?

Introduction
The lessons are presented to the students as PowerPoint slides as shown in the title slide below. The Teacher’s Guide will provide you with information and tips on how to explain each slide. It will also provide you with exercises/activities that you can ask the students to do.

Tip
Establish rapport with the students by asking them to answer the question on the title slide. This will serve as a motivation activity by letting them know that you are interested in what they know and that you give importance to what they have to say. This will also encourage them to actively participate in the lecture / discussion. Their answers in turn, no matter how brief they are, will help you gauge their understanding of the subject matter. There is no need to discuss their answers at this point.
Note

The Teacher’s Guide provides notes and tips for the PowerPoint presentation that you will use in conducting the course. This is an introductory lesson about the Internet. More comprehensive lessons about the Internet will be found in Module 5: The Internet as an information resource, and in Module 6: Getting a Web Page Up and Running. This lesson will be followed by a hands-on exercise dealing with using a web browser to access the Internet and the World Wide Web.

Slide 5-6: What is the Internet?

Note

Slide 5 defines the Internet.

Slide 6 describes it as a network of people.

The Internet is a global network of computers communicating under one set of guidelines, formally called the Transmission Control Protocol/Internet Protocol (TCP/IP). The Internet is a network of networks of computers. It contains digital information that can be accessed by any computer connected to it. Since it is an interconnection of computers, it is also called the Net.

Who runs the Net?
Nobody. Through mutual agreement and cooperation people use the Net according to standard protocols set by the Internet Society (ISOC). The Society is a nonprofit organization dedicated to encouraging cooperation among computer networks.
Slide 7: How Do You Connect to the Internet?

Note

Any computer can be connected to the Internet by means of a telephone line, a modem (56 k) and an Internet service provider. You will also need a network card to connect the computer to the telephone line. This kind of connection is called a dial-up connection. It can normally handle 30,000 to 50,000 bits per second.

You can also get connected by means of cable and/or DSL. These two methods are broadband and thus provide faster connection but are more expensive. A high speed line or a T1 line can handle 1.5 million bits per second.

Slide 8: The Web Components

Note

The Internet Components

The Internet is made up of many components that work together to make access to information faster. These are web browsers and servers, search engines, HTTP and HTML, URLs, and web pages.

• Web browsers are application software used to access files or applications, which are located and run by web servers in response to a query by a user.
• Web pages contain information which may be in a variety of formats.
• HTTP is the protocol used by the WWW. HTML is the language used to create and display web pages.
• Search engines are programs that are used to search for web pages.

Slide 9: Web Browsers and Servers

Note

Web Server

This is a computer that delivers web pages to browsers and other files by means of the HTTP protocol. It includes the hardware, software, TCP/IP protocols and the content.
Web Browsers

Programs that serve as the user interface to the Internet are called browsers. Web pages are accessed by the user via the browser. For example, to access a Web site, the user merely types the URL of a site on the address field of the browser and presses the enter key; the browser automatically links to the site and displays it to the user. It invokes additional software as needed (for example, if sound or moving images need to be displayed).

Examples of browsers are:

- Mosaic (1993). Developed by Marc Andreessen, Eric Bina and others at the University of Illinois National Center for Supercomputing Applications (NCSA). It was the first multimedia browser for the Web.
- Netscape Navigator (Mid 1990’s). Also developed by Andreessen and Bina along with James Clark of Netscape Communications Corporation.
- Microsoft’s Internet Explorer or IE is included in every Windows PC. Originally called Mosaic, which Microsoft bought after it was licensed by the University of Illinois to Spyglass Inc.
- Mozilla. An open source web browser and toolkit from the Mozilla Foundation (www.mozilla.org). It originally meant "Mosaic Killer." It can be downloaded from the Internet.
- Firefox. Also an open source Web browser for Windows, Mac and Linux from the Mozilla project.
- Safari is the browser for Mac OS X.

Tip

When describing the Internet Explorer, open the browser and point to the components.

To know more about other browsers aside from those mentioned, go to:

- [http://www.howstuffworks.com/web-server.htm](http://www.howstuffworks.com/web-server.htm)
- [http://dir.yahoo.com/Computers_and_Internet/Software/Internet/World_Wide_Web/Browsers/](http://dir.yahoo.com/Computers_and_Internet/Software/Internet/World_Wide_Web/Browsers/)

Slide 10: HTTP and HTML

Note

- Web servers and browsers use HyperText Transfer Protocol (HTTP), an Internet-standard protocol, to handle the transfer of text and other files
between different computers. HTTP defines how messages are formatted and transmitted, and what actions web servers and browsers should take in response to various commands.

- HTML defines how web pages are formatted and displayed by web browsers. A website is a collection of web pages.

**Slide 11: The World Wide Web**

**Note**

World Wide Web (WWW) is the collective name for all the computer files in the world that are accessible through Internet web servers made possible by HyperText Transfer Protocol (HTTP), HyperText Markup Language (HTML) and browsers. The heart of the Web is the Uniform Resource Locator. It was developed by at the European Organization for Nuclear Research (CERN) in 1989.

How is information transferred on the Net?
Computers on the Internet observe standard rules or procedures called protocols when they communicate. The Transmission Control Protocol/Internet Protocol (TCP/IP) is the language of the Internet. The protocol was developed by the U.S. Department of Defense Advanced Research Projects Agency for its ARPANET.

The TCP/IP breaks the information to be transferred into packets. Each packet contains information and the addresses of the receiving and sending computers. The routers in the Internet provide the packets with direction as they travel from one computer to another until they reach their destination computer. The Internet is a packet-switched network because of the way in which it sends information.

**Slide 12: Domain Name System**

**Note**

The Domain Name System (DNS) converts host names (web server) and domain names into IP addresses on the Internet or on local networks that use the TCP/IP protocol.

An example of a DNS is: mail.cslib.upd.edu.ph while the IP address is
The DNS is a hierarchy of database servers that start with the root servers for all the top level domains. The domain name is the organization's identity on the Web, and the host name is the name of the actual web server within that domain.

How can a router identify the computers on the Internet? Computers on the Internet are given names and IP addresses. People usually find it easier to deal with natural language names instead of numeric IP addresses. The natural language names are called Domain Name System (DNS). Example: mail.cslib.upd.edu.ph

Using this example, the meaning of the conventions are:
- mail stands for the name of the computer
- cslib stands for the name of the building where the computer is located
- upd stands for the organization where the building is located
- edu indicates that the organization is an educational one
- ph stands for the country where the computer is located (the Philippines). The period call dots separate the different levels of names. The top-level domain names are on the right of the name. All names are in lower case.

Top-level domain names usually indicate the nature of the institution and the country where it is to be found. Examples are:
- edu for education
- gov for government
- org for organization
- com for a commercial establishment
- mil for military groups

Country designations are also standard. Only the United States has no indication of country name in its DNS.

Examples are:
- ph for Philippines
- au for Australia
- sg for Singapore
- jp for Japan
Note

Hyperlinks are special HTML codes included in Web pages that connect web resources, instruct the browser to fetch a resource, run an application or jump to another site.

Hyperlinks consist of the following:

- HTML tags - instruct web browser and web servers which file to get or what program to run, including URL’s and/or pointers to applications and files to run
- Anchor text or images - used to place a hyperlink, the clickable object that activates the hyperlink
- Uniform Resource Locators (URL) – act as addresses for web resources

Hypertext "links" can lead to other documents, sounds, images, databases (like library catalogs), e-mail addresses, etc.

Slide 14: Uniform Resource Locators

Note

The Uniform Resource Locator

To locate resources, the Uniform Resource Locator (URL) is used. The URL contains

- http -- for the hypertext transfer protocol followed by
- :// which may or may not be followed by WWW
- the DNS
- and the location of the file or resource in the computer.

For example a file containing the web catalog of a library can have the URL http://www.gutenberg.org/catalog/ and http://rizal.lib.admu.edu.ph. In the latter case it is also the website of the library.

Sample URL’s

- http://lcweb.loc.gov
- http://www.ifla.org
- http://www.ala.org

Slide 15: Ways to Locate Information
Note

Being familiar with most of the major search tools and their capabilities allows you to search effectively. Some examples are:

Net surfing
Surfing refers to the technique of jumping from one hyperlink to another through multiple web pages. It can be used effectively only when you’ve found a group of pages that are related to the topic you are searching. You may wish to follow each of the links to each of the pages in search of valuable information.

Search engines
Search engines are the fastest way to locate information on the Internet. Some examples are:
- Altavista
- Google
- Infoseek

Metasearch engines
These are tools that search all the big databases simultaneously and return a consolidated list of findings. An example is Metacrawler.

Subject directories
These offer lists of subjects which can be used to find web pages indexed under these subjects. Examples are:
- Lycos
- Yahoo

Newsgroups and Listservs
These are electronic mailing lists that are useful since each list deals on a specific subject.

Other
- Virtual libraries—Libraries on the Net (Internet Public Library)
- Library catalogs on the Web—Includes catalogs of libraries
- Online databases—abstracts and indexes
- E-journals—Journals available on the Net
- Organizations—Homepages of organizations
Note

Information materials include:

- Locally available databases: library catalogs, abstracts and indexes, full-text, multimedia.
- Directly available from hosts: abstracts and indexes, full-text, multimedia.
- Available via the Internet: abstracts, indexes, e-journals and other full-text documents, multimedia.
- Many libraries have published their catalogs on the Internet.
- Databases (abstracts and indexes) are accessible online via the Net. Some charge fees but others are free.
- Library of Congress Catalog.
- OCLCs First Search.
- Commercial services: EBSCO, ISI, H.W. Wilson, OVID.
- Encyclopedias, dictionaries, directories, newspapers.

Slide 17: Some Sites with Free Information Materials

Note

There are many sites on the Net which offer information materials, music, software, etc., for free.

The following sites offer access to encyclopedias, dictionaries, thesauri, abstracts and indexes, almanacs, full-text books and journals, software, music, and many more.

- Access to articles, documents, books, etc., is possible through
  - [http://www.scholar.google.com](http://www.scholar.google.com)
- Books
  - [http://www.nap.edu/about/availpdf_phtml](http://www.nap.edu/about/availpdf_phtml)
  - [http://www.gutenberg.org/catalog/](http://www.gutenberg.org/catalog/)
- Journals
  - [http://www.doaj.org/home](http://www.doaj.org/home)
  - [http://aera-cr.asu.edu/links.html](http://aera-cr.asu.edu/links.html)
  - [http://www.freefulltext.com](http://www.freefulltext.com)
- Library and information science
  - Associations
    - Special Libraries Association ([http://www.sla.org](http://www.sla.org))
    - American Library Association ([http://www.ala.org](http://www.ala.org))
    - American Society for Information Science and Technology ([http://www.asis.org](http://www.asis.org))
Slide 18: What can you do on the Internet?

Note

The only way to learn how to use the Internet is to become part of it. There are many tools that you can use. Some of these are:

- TelNet (Terminal Emulation Link Network) This tool allows you to connect to another computer other than the one you are using.
- FTP (File transfer Protocol). This tool allows you to transfer files from one computer to another. It may be from your computer to another computer or vice-versa.
- WWW (World Wide Web) The WWW was developed from ideas and technology first used in Gopher. The pointer to other information was developed into links using the hypertext mark up language (HTML) and the hypertext transfer protocol (HTTP). The browsers, Internet Explorer and Netscape Navigator make use of this technology to search the global information cyberspace.
- E-mail (Electronic mail) is a method of sending, and receiving messages across the Internet. This is now a common way of sending messages to colleagues either within or outside the organization.
-USENET is a collection of discussion groups or newsgroups. Users can read items posted in electronic bulletin boards and they can respond to them. Their responses are also posted in the board for other users to see.

Slide 19: Issues

Note

There is a lot of information on the Internet but not all is useful since anyone who knows how can publish on the Net.

The user must establish the:
- Accuracy of documents
- Authority of web documents
• Currency of information
• Limitations in technology
• Credibility of the site where it is published (domain name)

Issues and problems
• Proliferation of junk: outdated information, “dead links and/or sites”, and other “garbage on the Net”.
• Information about when the document was last updated often is not provided.
• Access is not always possible because of technology limitations.
• Interfaces vary from site to site.
• The researcher must be knowledgeable about user interfaces: search syntax; search tools; etc.
• Web content often is not edited or reviewed for accuracy, authority, currency, etc.
• User effort is required to evaluate the quality of the information.
• Web site must be evaluated before it is used as a source of information.

IPR and copyright
Provisions must be observed. A succinct summary of the Digital Millennium Copyright Act can be found at: http://www.copyright.gov/legislation/dmca.pdf

Web resources must be cited
Good guides for citing web resources may be found in the MLA and APA guides.

Slide 20: Why is the Internet Important for Librarians?

Note
Why do we need to use the Net?
The Internet is a vast information resource that librarians can no longer ignore. It is a virtual library that can be tapped for all types of information from indexes and abstracts to full text and multimedia. In addition to being able to find vast amounts of information, the Web or Net could also be used to find people and meet with them in cyberspace. The Internet uses a telecommunications infrastructure to carry information from one computer to the next. Depending on your location and the availability of telecommunications facilities in your locality, you may connect to the Net in various ways. If your office or residence has a direct connection to the Net you can plug your computer into any data outlet and connect to the Net. If you are using a phone line you need to use a modem. The modem converts digital
information to sound and vice versa. At the end of all of these connections is an Internet Service Provider. The provider connects you to the Web.

**The advantages in using the Internet include:**

- Many information resources may be accessed through the Internet:
  - Online library catalogs (OPACs)
  - Documents
  - Databases
  - Educational and information services
- Documents can be sent through the Internet (e.g., inter-library loans)
- Librarians can communicate with people using e-mail, chat, newsgroups, etc.

**Activities**

**Activity 1.6.1**

Hands on exercises in searching the Internet (World Wide Web, using web browsers and using some Internet tools and services). (10 points)

**Tip**

During the hands-on session, just provide very simple instructions and let the students discover the Internet as they use it. Guide them along by recalling the basic concepts; point them to relevant sites on the web containing information, and assist as necessary.

**Assessment**

**Assessment 1.6**

Answer the following.

(10 points) What is the Internet? Enumerate the benefits that can be derived by your library from the use of the Internet.

End of Lesson 6 of Module 1
Module 1
Introduction to Information and Communication Technologies
Teacher’s Guide

Lesson 7: What are Some Trends and Issues that you need to know about ICT?

Introduction
The lessons are presented to the students as PowerPoint slides as shown in the title slide below. The Teacher’s Guide will provide you with information and tips on how to explain each slide. It will also provide you with exercises/activities that you can ask the students to do.

Slide 1. This is the title slide for lesson 7.

Tip
Establish rapport with the students by asking them to answer the question on the title slide. This will serve as a motivation activity by letting them know that you are interested in what they know and that you give importance to what they have to say. This will also encourage them to actively participate in the lecture / discussion. Their answers in turn, no matter how brief they are, will help you gauge their understanding of the subject matter. There is no need to discuss their answers at this point.
Slide 2: Rationale

Slide 3: Scope

Slide 4: Learning Outcomes

Note
The Teacher’s Guide provides notes and tips for the PowerPoint presentation that you will use in conducting the course.

Tip
This is the last lesson for Module 1. Use this Lesson to recall and wrap up the concepts and lessons learned in the previous lessons, and to emphasize the trends and issues in using ICT.

Slide 5: Trends

Note
The following topics should be discussed:
- Development of standards in ICT applications led to globalization. Communication between computers is possible because of standards for hardware, software and content. These include the use of TCP/IP as a standard protocol, the use of html tags and Domain name system and URL systems, the use of Windows and Unix, as standard operating systems, the interoperability of different systems due to protocols like Z 39.50, and MARC 21, and other standards like tiff, jpeg, etc.
- User friendly interfaces led to the increased use of ICTs and the Internet.
- Developments in hardware led to faster access and retrieval, greater storage capacities, and developments in software.
- Software became more sophisticated and operations became more efficient.
- Research in software led to developments in open source operating systems, relational database management systems and file systems, browsers, office software such as Linux, phpMylibrary, MYSQL, Greenstone, open office, Mozilla, etc.
• Digitization led to digital formats for books, journals, music, video, etc. There are e-books, e-journals and databases, and free materials that are downloadable from Internet sites.
• Development of the Internet is opening new possibilities in communication and data transfer.

Slide 6: Issues

Note
The issues in the application of ICT in library operations and services are those affecting:

• Legal and regulatory concerns
  o Intellectual property rights
    ❖ Information access and dissemination
    ❖ Acknowledgement of source of information
    ❖ Plagiarism
  o Copyright infringement
    ❖ “Fair use” guidelines
• Moral and ethical
  o Censorship
    ❖ Pornography
    ❖ Cultural/religious concerns
  o Information privacy
    ❖ Reading and distributing e-mail
    ❖ Spam mail, etc.
• Political
  o Transborder data flow
  o Government control
  o National security concerns
• Social and educational
  o ICT literacy
  o Access to information
  o Impact on culture
  o Gap between rich and poor
• Economic
  o Charging for information
  o Copyright infringement
  o Private vs. public sector roles in ICT development
• Technology
  o Speed of development in hardware and software
  o Cost of upgrades (hardware and software) and licenses
  o Language dominance
• Script multiplicity

• Security—Concerned with a system of safeguards against deliberate or accidental damage to the system or data
  o Computer crimes and hackers
  o Confidentiality of information

Slide 7: ICT and Libraries

Note

Librarians must conduct a systems analysis before using ICT in libraries. Applications include those affecting:

• Collection Development--Print versus electronic information
  o Consider cost, availability of technology, ICT literacy of users and staff

• Organization of the Collection—Metadata
  o Consider using metadata in providing access to e-resources

• Service
  o Consider circulating e-books and e-journals. Systems are available for such services
  o Consider providing self-service systems
  o Consider providing e-reserve
  o Consider providing access to databases (free and not free)
  o In all cases observe copyright provisions

• Library automation
  o Study your system before acquiring a system
  o Consider open source systems
  o Train staff on OS for open source
  o Consider costs for the system, retrospective conversion, training, etc.

• Organizational issues. Review organization of the library and consider setting up
  o An ICT department
  o A marketing and promotion team
  o A research and development team

• Staff recruitment and development issues
  o Develop criteria for selection
  o Develop a staff training program

• Digitization
  o Develop criteria for selection of materials for digitization
  o Consider services for in-house e-resources

• Technology considerations
  o Hardware
  o Software
Cost
Other needs

Budget implications
Cost of purchase
Cost of upgrade and maintenance
Cost of training

Tip
Wrap up Module 1 by recalling the learning outcomes and ask whether the outcomes were met after going through all the lessons.

Activities

Activity 1.7.1
Group discussion. Form into groups and list all issues and concerns regarding the use of computers and the Internet in libraries. Elaborate by citing cases and actual situations. Sum up by creating policy guidelines that could be used to address such issues and concerns.

Assessment

Assessment 1.7
Answer the following.
(10 points) What are some trends and issues in ICTs and libraries?

End of Lesson 7 and of Module 1
Module 1
Introduction to Information and Communication Technologies

Evaluation Form

**Instructions:** To help us enhance the quality and effectiveness of the Modules in the Training Programme, please complete and return this evaluation form to the teacher. Please rate Module # 1 on the following categories using the scales below by drawing a circle around the appropriate number.

- **5 = Strongly Agree [SA]**
- **4 = Agree [A]**
- **3 = Not Sure [N]**
- **2 = Disagree [D]**
- **1 = Strongly Disagree [SD]**

### 1. Objectives and Content

<table>
<thead>
<tr>
<th></th>
<th>SA</th>
<th>A</th>
<th>N</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Were the Module objectives clearly stated?</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Were the objectives achieved?</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Were the topics presented relevant to your work?</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Was the Module structured in a logical way?</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Were the activities appropriate to the content of this Module?</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Was the Module easy to follow?</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Was the Module interesting and enjoyable?</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Were your expectations met?</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
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</table>

### 2. Presentation

<table>
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<tr>
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<th>A</th>
<th>N</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Were the concepts and techniques explained clearly?</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Were you encouraged to actively participate during the Module?</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Were your individual questions/problems discussed to your satisfaction?</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Was the Module well paced?</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Were the lessons presented in a clear and well organized manner?</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

### 3. Teacher

<table>
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<tr>
<th></th>
<th>SA</th>
<th>A</th>
<th>N</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Was the teacher knowledgeable in the subject matter?</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Did the teacher present the material effectively?</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Did the teacher show interest in and enthusiasm for the subject?</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Was the teacher effective in answering questions clearly and constructively?</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>
4. Learning Environment

Are the Module materials easy to read?  
Were the manual and the other handouts useful?  
Were the visual aids useful?  
Was the venue suitable?  
Was the time frame appropriate?

5. Before the training began, how experienced were you with the subject?
   1 (Beginner)  2 (Intermediate)  3 (Advanced)  4 (Expert)

6. How useful was the training for your level of experience?
   1 (Not Useful)  2 (Fairly Useful)  3 (Useful)  4 (Very Useful)

7. Do you feel you have gained new skills and knowledge?  Yes  No

8. What is the most important concept or skill that you learned in this Module?
   ________________________________________________

9. What is the least important concept or skill that you learned in this Module?
   ________________________________________________

10. What additional information should be included in the Module?
    ________________________________________________

11. What did you like most about the training materials?
    ________________________________________________

12. What did you like least about the training materials?
    ________________________________________________

13. Other comments or suggestions?
    ________________________________________________

THANK YOU!
Empowering Information Professionals:  
A Training Programme on Information and Communication Technology

Editor: Andrew Large  
McGill University, Canada

Module 1
Introduction to Information and Communication Technologies  
Student’s Text

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UNESCO BANGKOK  
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2006
David, Lourdes T.


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Module 1
An Introduction to Information and Communication Technologies

Student’s Text

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Empowering Information Professionals:
A Training Programme on Information and Communication Technology

General Guidelines for the Student

Introductory Note
Library schools are now changing their curricula to produce graduates who are prepared for the changing service requirements in libraries. The majority of practitioners, however, graduated before the advent of the Information Age or studied in schools that did not teach ICTs for various reasons. This group of practitioners is now finding itself unprepared for the new demands of the profession. This Training Programme is in response to this identified need.

People working in libraries and information centers are the primary target group of the Training Programme. It is intended to provide them with the knowledge and skills to deal with the application of ICTs to library and information services. It is also intended for use by teachers of students in library schools and of personnel in library and information centers. The Package has been developed by the UNESCO Asia and Pacific Regional Office with funding from the Japanese Funds in Trust for Communication and Information.

Rationale
In 1961, Marion Harper Jr. wrote, “To manage a business well is to manage its future; and to manage the future is to manage information.”¹ Less than 25 years later, John Naisbitt, in discussing the ten megatrends in his opinion were happening in the US, said “None is more subtle, yet more explosive, I think than this first, the megashift from an industrial to an information society.”² According to Naisbitt, “In 1950, only 17 percent of us worked in information jobs. Now more than 60 percent of us work with information as programmers, teachers, clerks, secretaries, accountants, stock brokers, managers, insurance people, bureaucrats, lawyers, bankers and technicians.” He groups librarians among professional workers who “are almost all information workers…”³ Today, society is in the “Information Age,” an age where information is power.

³ Ibid, p. 14-15
Content of the Training Programme
The Training Program contains nine modules:
• Module 1 - Introduction to Information and Communication Technologies
• Module 2 - Introduction to Library Automation
• Module 3 - Information Seeking in an Electronic Environment
• Module 4 – Creation and Management of Databases Using CDS/ISIS
• Module 5 - The Internet as an Information Resource
• Module 6 - Web Page Concept and Design: Getting a Web Page Up and Running
• Module 7 - Library Management and Promotion
• Module 8 - Digital Libraries and Open Access
• Module 9 - Intellectual Property Rights in the Digital Age

The Student’s Text contains the following:
• General Guidelines
  • Introductory Note
  • Rationale
  • Content of the Training Programme
  • Prerequisites
  • Typographical Conventions
• Overview of Module
  • Learning Outcomes
  • Schedule
  • Module Outline
  • Grading Policy
  • Lessons
  • List of Activities
• Reading/Reference List
• Glossary

Prerequisites
The student must have a genuine interest in understanding the impact of new information technologies on the practice of Library/Information Service.

Typographical Conventions
The following conventions are used through out the module.

Course Guide
General introduction to the Modules
Course Objectives
General introduction to the learning outcomes of the Module

Note
General note to the teacher and additional information

Tip
Teaching tips and supplemental materials

Activity
Activity for the students

Assessment
Questions/Activities to measure learning

End of General Guidelines
Module 1
An Introduction to Information and Communication Technologies

Student’s Text

Overview

This is the Student’s Text of Module 1 of Empowering Information Professionals: A Training Programme on Information and Communication Technology. Module 1 is an introduction to information and communication technologies (ICT).

Module 1 covers the basic concepts of information and communication technologies, the impact of ICTs on society and the reasons why librarians need to acquire ICT knowledge and skills. It is a prerequisite to the other eight modules. Prior knowledge could be credited but the student must take and pass all the tests for the seven lessons in this module to be allowed to take the other eight modules.

Learning Outcomes

The goal of this Module is to provide the practicing librarian with the skills and knowledge needed to handle the demands of the Information Age. In addition, this course will provide insights on the role of the librarian in an information society.

By the end of the Module students should be able to:

1. Understand the characteristics of the Information Society and the developments that led to its growth.
2. Appreciate the growth of the information industry; its impact on library and information service; and on librarians and other information professionals.
3. Appreciate the capabilities of the computer as a productivity tool in the creation, collection, consolidation and communication of information.
4. Understand the different components of the computer system and computer networks, their classification and functions within the computer system.
5. Understand and acquire skills in using software such as word processors, electronic spreadsheets, and electronic presentations.
6. Be aware of ethical, legal and technological issues and trends concerning the use of ICTs in libraries and information centers.

**Schedule**

<table>
<thead>
<tr>
<th>Day</th>
<th>Lessons</th>
</tr>
</thead>
</table>
| Day 1 | Lesson 1. Why do librarians need to know about ICTs and acquire skill in their use?  
Lesson 2. How do computers work? |
| Day 2 | Lesson 3. What are the hardware components of a computer?               |
| Day 3 | Lesson 4. What are the software components of a computer?              |
| Day 4 | Lesson 5. What are the components of a network?                        
Lesson 6. What are the components of the Internet?                    |
| Day 5 | Lesson 7. What are some trends and issues that you need to know about ICTs? |

**Module Outline**

**Lesson 1. Why do librarians need to know about ICTs and acquire skill in its use?**

**Scope**
- What are ICTs?
- What is the impact of ICTs on Society?
- What is the impact of ICTs on the library and other information centers?
- What is the impact of ICTs on the librarian and on library education?
- What are the major trends and issues in libraries that resulted from ICTs?

**Objectives**
At the end of this lesson, students should be able to:
- Identify the impact of ICTs on the work environment in libraries.
- Realize the impact of ICTs on information formats, access and delivery.
- Recognize ICTs as tools that librarians can and must use to meet the information requirements of users.

**Lesson 2. How do computers work?**

**Scope**
- What is a computer?
- What are the elements of a computer system?
- What are the different types of computer systems?
- What are the components of a data

**Objectives**
At the end of the lesson, students should be able to:
- Describe how computers process information.
- List the elements of a computer system.
- Identify the different types of computer
| processing cycle? | What is the role of a computer in the data processing cycle? | What are some trends in the development of computers? | systems and their uses. | Explain the data processing cycle. | Define the role of computers in the data processing cycle. | Be aware of development trends in ICTs. |

**Lesson 3. What are the hardware components of a computer?**

**Scope**
- What is hardware?
- What is an input device?
- What is a processor?
- What is an output device?
- What is a storage device?
- What other hardware is found in a computer?
- What are some general trends in the development of computers?

**Objectives**
At the end of this lesson, students should be able to:
- Identify the hardware components of a personal computer system.
- List major input and output devices.
- Explain the functions of processing, memory, storage and communication devices.
- Realize the significance of each hardware component in processing information.
- Be familiar with general trends in the development of the different hardware components of a computer.

**Lesson 4. What are the software components of a computer?**

**Scope**
- What is software?
- What are the two kinds of software?
- What is programming?
- What are viruses and how do you deal with them?
- How do computers respond to different character sets?
- What are some general trends in software development?

**Objectives**
At the end of this lesson, students should be able to:
- Define the function of software in a computer system.
- Distinguish between an operating system and an application system.
- List different types of operating systems and application software.
- Define what are programming languages.
- Identify and avoid computer viruses.
- Compare different character sets.
- Be aware of general trends in software development.

**Lesson 5. What are the components of a network?**

**Scope**
- What is a network?
- What are the components of a network?
- What are the different types of

**Objectives**
At the end of this lesson, students should be able to:
- Define what is a network.
### Lesson 6. What is the Internet?

**Scope**
- What is the Internet?
- What Internet tools are available?
- What is the World Wide Web?
- What is e-mail? FTP? Chat?
- What are online information resources?
- Why is the Internet important to libraries?
- What are some issues and concerns in using the Internet?

**Objectives**
At the end of this lesson, students should be able to:
- Define what is the Internet and other Internet concepts and terms.
- Describe Internet tools and services.
- Identify information resources for libraries on the Internet.
- Use online information resources on the Internet.
- Realize the importance of the Internet to libraries.
- Discuss some issues and concerns regarding the use of the Internet in libraries.

### Lesson 7. What are some trends and issues that you need to know about ICTs?

**Scope**
- What are the legal and regulatory issues that affect ICT applications?
- What are the ethical and moral concerns in using ICTs?
- What political, social, and economic factors should be considered in using ICTs?
- What are the main security issues concerning computer use/Internet access?
- What technological concerns must be addressed in using ICTs in libraries?
- What are the main policy issues relating to ICTs and which developments in ICTs might affect library service?

**Objectives**
At the end of this lesson, students should be able to:
- Identify the trends and issues in ICT developments and applications.
- Be aware of the legal, ethical, moral, social, economic, and technological concerns relating to computer use/Internet access.
- Define various policy issues related to ICTs in libraries.
- Recognize developments in ICTs that will affect library service.
**Grading Policy**
A score of 85 points is needed to pass the Module. The breakdown of the points for the module exercises is as follows:

<table>
<thead>
<tr>
<th>Lessons</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lesson 1. Why do librarians need to know about ICTs and acquire skill in their use?</td>
<td>10</td>
</tr>
<tr>
<td>Lesson 2. How do computers work?</td>
<td>10</td>
</tr>
<tr>
<td>Lesson 3. What are the hardware components of a computer?</td>
<td>10</td>
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<tr>
<td>Lesson 4. What are the software components of a computer?</td>
<td></td>
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<tr>
<td>Windows 98 or Higher</td>
<td>10</td>
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<tr>
<td>Word Processing</td>
<td>10</td>
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<tr>
<td>Spread sheets</td>
<td>10</td>
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<tr>
<td>Presentation</td>
<td>10</td>
</tr>
<tr>
<td>Lesson 5. What are the components of a network?</td>
<td>10</td>
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<tr>
<td>Lesson 6. What are the components of the Internet?</td>
<td>10</td>
</tr>
<tr>
<td>Lesson 7. What are some trends and issues that you need to know about ICTs?</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
Module 1
An Introduction to Information and Communication Technologies

Student’s Text

Lessons

Lesson 1: Why do Librarians need to know about ICTs and acquire Skill in their Use?

Lesson 2: How do Computers Work?

Lesson 3: What are the Hardware Components of a Computer?

Lesson 4: What are the Software Components of a Computer?

Lesson 5: What are the Components of a Network?

Lesson 6: What is the Internet?

Lesson 7: What are the Trends and Issues in ICT Development affecting Libraries?
Lesson 1: Why do Librarians need to know about ICTs and acquire Skill in their Use?

Slide 1

Module 1
Introduction to Information and Communication Technologies (ICTs)

Lesson 1
Why do Librarians need to know about ICTs and acquire Skill in their Use?

Slide 2

Rationale
In Asia, information is recognized as an important resource, but the ICT tools to create, collect, consolidate and communicate information are not yet used in the majority of libraries.
Scope

- What are ICTs?
- What is the impact of ICTs on Society?
- What is the impact of ICTs on libraries and information centers?
- What is the impact of ICTs on the librarian and on library education?
- What are the major trends and issues in libraries that result from ICTs?

Learning Outcomes

By the end of this lesson, you should be able to:

- Identify the impact of ICTs on the work environment in libraries
- Realize the impact of ICTs on information formats, access and delivery
- Recognize ICTs as tools that librarians can and must use to meet the information requirements of users

What are ICTs?

Information
Communication
Technologies

ICTs are the hardware and software that enable society to create, collect, consolidate and communicate information in multimedia formats and for various purposes.
Slide 6

Impact of ICTs on Society

Developments in ICTs have brought about the merger of the computing, information, communications, entertainment and mass media industries, providing a means of exchanging information in the digital format used by computers.

Slide 7

ICTs are in all facets of society.

Slide 8

What is the Response of Industry and Government to the Information Society?

- Increased production and availability of more powerful ICT hardware and software
- Provision of more efficient national and global information infrastructures for more efficient access and delivery of information
- Increased production and publication of multimedia digital information
Slide 9

What is the Impact of ICTs on Libraries and Information Centers?

- ICTs made information creation in digital format possible.
- ICTs made online access and file transfer possible.
- ICTs made networking and sharing of information resources possible.

Slide 10

The Shift from Print To Digital

ICTs have made the transfer of digital information from remote sites possible.

Slide 11

Impact of Digital Information Materials on Libraries

- Digital information can be sent in multiple copies simultaneously over information networks in fractions of a minute or even of a second. There is no need for users with PCs attached to the network to physically go to the library. They can access information via their PCs.
- Digital information can be cut and pasted from one document into another.
- Digital information may be free or cheaper than print equivalents.
- Digital information often modifies librarians' roles in various ways.
What are the Effects of these Developments on the User Community?

- Increased level of technology literacy
- Increased demand for better and faster access to information
- Aggravation of discrepancies between the information rich and information poor.

What is the Impact of ICT on Librarians and Library Education?

- Need for ICT knowledge
- Need for ICT skills
- Need for ICT tools
- Need for continuous learning in the context of rapidly changing ICTs

Library schools must integrate ICTs into their curricula and short courses to produce graduates who can cope with the changing work environment.

What are the Perceived Roles of Librarians in an Information Society?

- *Creators:* developers and producers of information products and services
- *Collectors:* librarians, archivists and records managers
- *Communicators:* information workers, extension workers, subject specialists
- *Consolidators:* reference librarians, information brokers, analysts

(A Curriculum for an Information Society, 1998)
Slide 15

What will be the Trends in the Development of Libraries?

The library will:

- be networked
- be stocked with a core collection that is multimedia
- have access to global information
- become digital
- become virtual

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Slide 16

Challenges to Libraries

- Collection development
- Resource sharing through networking
- Faster direct communication among scientists and researchers
- Virtual vs. onsite reference services: push and pull technologies
- Better document delivery systems
- Better abstracting and indexing systems
- Availability of full-text materials on the Internet
- Information management vs. collection management

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Slide 17

Conclusion

Libraries and librarians must cope with the demands of an information society. Librarians must have the knowledge, skills and tools in handling digital information to be efficient creators, collectors, consolidators and communicators of information. Librarians with the knowledge, skills and tools required of information professionals in an information society will be the key success factors in enabling the library to perform its role as an information support system for society.

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End of Lesson 1 Module 1
Lesson 2: How do Computers Work?

Slide 1

Module 1
Introduction to Information and Communication Technologies

Lesson 2
How do Computers Work?

Rationale

The lesson will introduce you to the computer. Your knowledge about the elements of the computer and how they work will enable you to easily understand the later lessons on hardware, software and networks.
**Scope**

- What is a computer?
- What are the elements of a computer system?
- What are the different types of computer systems?
- What are the components of a data processing cycle?
- What is the role of a computer in the data processing cycle?
- What are some trends in the development of computers?

**Learning Outcomes**

By the end of this lesson, you should be able to:

- Describe how computers process information
- List the elements of a computer system
- Identify the different types of computer systems and their uses
- Explain the data processing cycle
- Define the role of computers in the data processing cycle
- Be aware of development trends in ICTs

**What is a Computer?**

A computer is a machine with electronic and electromechanical parts. It is programmable and is capable of performing the following functions:

- Accepting data (input)
- Processing data
- Generating output (information)
- Storing data/information
- Retrieving/sending data/information
Slide 6

How is Data Processed into Information?

- Input
- Process
- Output

Author
Title
Imprint
Subject
Call No.
Accession No.
Catalog Record
Card Catalog
Storage

Slide 7

What is the Role of Computers in the Information Cycle?

- Accept data through input devices
- Process data using microprocessors
- Store data for interactive use in the RAM and for longer periods of storage in the ROM and hard disks
- Output data through output devices.

Slide 8

The Information Processing Cycle

Input
Document
Stored Data

New Document
Output

Process
Elements of a Computer System(1)

1. People - the most important part and beneficiary of a computer system, generally categorized as either end-users or developers.
2. Procedures - are descriptions of how things are done, i.e. manuals, documentation, ...
3. Data/Information - raw facts (data) and processed data (information) that are used to produce the desired result.

Elements of a Computer System(2)

4. Hardware - the physical elements of a computer system categorized according to the basic operations they perform: input, processing, output, storage and communications.
5. Software - provides the step by step instructions that tell the computer what to do. Generally software is divided into system software and application software.
6. Communications - refers to the electronic transfer of data from one place to another.

How is Data Represented in the Computer?

Computers represent data as two-state systems. This means that the computer recognizes only two numbers, 0 and 1. Larger numbers, letters and special characters are formed using combinations of 0 and 1. Each of these two numbers is called a bit from the words binary digit. The combination of bits to form meaningful characters or numbers is called a byte.
What Coding Schemes are Used to Form Meaningful Bytes of Data?

- There are usually 8 bits in a byte. The coding scheme ASCII (As-key) and ASCII-8 or extended ASCII has been adopted as a standard by the US government and by computer manufacturers.
- ASCII can have 128 combinations of 7 bits each, while ASCII-8 can have as many as 1256 combinations.

Development of Computers

- The beginning of the commercial computer age began on June 14, 1951 with the delivery of UNIVAC - Universal Automatic Computer - to the US Bureau of Census.
- Prior to this, however, Charles Babbage invented the Difference Engine and conceived of another machine called the Analytical Engine. The latter had all the components of the computer: input, output, processing and storage. Babbage is called the father of computers.

What are the Computer Generations? (1)

- First generation, 1951-1958: Vacuum tubes were used as the internal computer components, punched cards and magnetic tapes for storing data, and machine language for programming.
- Second generation, 1959-1964: Transistors replace vacuum tubes, assembly languages and high level languages replaced machine languages, and the removable disk pack replaced punched cards. Transistors enabled manufacturers to produce smaller computers.
What are the Computer Generations? (2)

- Third generation, 1965-1970: Integrated circuits (ICs) developed. ICs led to the production of even smaller computers called mini computers. Software became more sophisticated.
- Fourth generation, 1971-present. The microprocessor or computer on a chip was developed. This led to Personal Computers (PCs).
- Fifth generation, present and beyond. Includes recent and emerging technologies, (voice recognition, artificial intelligence, neural systems, quantum computers, etc.)

What are the Different Types of Computer Systems?

- In general, computers are sorted according to physical size and processing power.
- The different types are: Supercomputer, Mainframe, Minicomputer, Microcomputer (Desktop, Laptop, Notebook, Palmtop), Microcontroller

What are the Advantages of Using Computers for Data Processing?

- Faster data input, processing and retrieval
- Tireless—can work 24 hours a day, 7 days a week
- Less prone to error
- Produce output requirements easily
- Can send and retrieve data from other computers if in a network
What are some Disadvantages of Using Computers?
- Require skilled manpower for design, programming and data encoding
- Require electricity
- Require air conditioning for non-stop work
- Expensive to acquire and maintain
- Require frequent upgrade due to fast developments in hardware and software
- Require regular staff training

What are some General Trends in Computers?
- Moore’s Law: Computing power doubles approximately every 18 months
- Faster processors
- Bigger storage capacity
- Bigger memory
- Stand alone>>>Network>>>Distributive computing
- Software bloat
- Lower cost

What are some General Trends in Hardware?
- Downsizing and right sizing: Mainframe >>> PC>>>Pocket PC
- Increasing memory: RAM 1MB to at least 256 MB
- Increasing storage: Hard disk now in GB
- Increasing processor speed: PC XT to Pentium 4
- Increasing storage capacity of auxiliary devices. Diskette to high capacity flash disks
What are some General Trends in Software?

- More sophisticated software
- Bigger storage requirement
- Bigger memory requirement
- More user-friendly operating system
  - DOS to Windows
- Use of open-source software
  - Operating system—Linux
  - Database management system—MRISQL
  - Library Management System—phpMylibrary, WebISIS

Conclusion

Computers are reliable and efficient tools for data processing and information retrieval. There are advantages and disadvantages in using them. The efficiency of these tools is dependent on the specifications of the computer hardware, the software, database design and the user.
Lesson 3: What are the Hardware Components of a Computer?

Slide 1

Introduction to Information and Communication Technologies

Lesson 3
What are the Hardware Components of a Computer?

Slide 2

Rationale

The hardware components are the tangible components of the computer. A knowledge of the tangible components will enable you to understand how the parts relate to one another. It will also help you troubleshoot when you meet problems in operating computers.
Scope
- What is hardware?
- What is an input device?
- What is a processor?
- What is an output device?
- What is a storage device?
- What other hardware is found in a computer?
- What are some general trends in the development of computers?

Learning Outcomes
By the end of this lesson, you should be able to:
- Identify the hardware components of a personal computer system
- List major input and output devices
- Explain the functions of processing, memory, storage and communication devices
- Realize the significance of each hardware component in processing information
- Identify general trends in the development of the different hardware components of a computer

What is Hardware?
- Hardware is the physical component of a computer system. It refers to the electromechanical parts and devices that make up a computer.
- Generally, hardware is categorized according to which of the five basic computer operation it performs:
  - Input devices
  - Processors and memory
  - Output devices
  - Secondary storage devices
  - Communications / networking devices
What are Input Devices?

Input hardware is used to enter data into a computer by encoding via keyboard, direct reading through scanners or pointing devices like the mouse. Input hardware converts data, e.g. text, image, drawings, into a form that a computer can understand and use.

Input Devices

- joystick
- trackball
- hand-held scanner
- keyboard
- flatbed scanner
- mouse
- touch tablet

The Outside and Inside of the Computer Housing

Front  Rear  Inside
Other Components Inside the Housing

- Housing is made up of materials that hold the electronics together.
- System board connects the CPU and other components of the computer.
- Expansion cards are circuit boards that provide more memory or control peripheral devices such as video adapter cards, network interface cards, etc.

What is the Processor?

- The Motherboard houses the processor and other components of the computer.
- Intel Celeron Processor

What is Memory?

- The computer’s workspace where application instructions and data are held during operation is called memory, also known as main memory, primary storage or RAM (Random Access Memory).
- The capacity of a memory is important because this is where data and programs are stored while they are active, thus bigger memory means bigger workspace. Whatever data is held in the RAM is erased when the computer is reset or the power is turned off.
Slide 12

The Random Access Memory (RAM)
- The amount of memory available determines the kind of software that can be run and how much data can be manipulated. The available RAM at present is 32 MB, 64 MB, 128 MB, 256 MB or more.

Slide 13

Read Only Memory (ROM)
- Aside from the RAM, the computer also has a ROM (Read only memory) which is used to store the boot program and other low-level information that enables the computer to start up and to recognize its hardware parts.

Slide 14

Output Devices
- Hardware used to display/produce the output of the computer system after processing data
- The output of computer processing is the usable information that the user requires. This information can be presented to the user in a variety of forms, depending on the output device.
**Slide 15**

**Output Devices**

- Main output devices are monitors for displaying the output and printers for producing a permanent copy.
- CRT monitor
- Flat panel
- Laser printer
- Speakers

**Slide 16**

**What are Storage Devices?**

- The hardware used to retain data for future use is called a storage device. These devices may be found inside or outside the computer.
- There are different kinds of storage devices. Among these are optical devices (CD-ROM, DVD), and magnetic devices (tapes, disks).

**Slide 17**

**Examples of Storage Devices**

- Magnetic: Hard disk, Floppy disk, Zip disk, Jaz disk, tapes
- Optical: CD-ROM, DVD (Digital Versatile Disk)
- Rewritable CDs and DVDs
Communications Devices
- Communications hardware, also called networking devices, is used to extend the processing capabilities of a computer system by providing a means of transferring data and applications from one computer system to another.
- Communications hardware is used to link to existing communication networks like the Internet that allow electronic transfer of information anytime, anywhere.

Communications Channels
- Wired links
  - Twisted-Pair (TP) Wires
  - Coaxial Cable
  - Fiber-optic cables
- Links Without Wires
  - Microwave Signals
  - Communications Satellites

Conclusion
Hardware is the physical part of the computer. Each component performs a specific function that contributes to the performance of the whole system.

End of Lesson 3 Module 1
Lesson 4: What are the Software Components of a Computer?

Slide 1

Module 1
Introduction to Information and Communication Technologies

Lesson 4
What are the Software Components of Computers?

Slide 2

Rationale

- A computer system is generally composed of hardware and software.
- Hardware comprises the physical components. Software comprises the set of instructions for the computer. Without software, the computer will not be able to perform the tasks that you would like it to do.
Scope
- What is software?
- What are the two kinds of software?
- What is programming?
- What are viruses and how do you deal with them?
- How do computers respond to different character sets?
- What are some general trends in software development?

Learning Outcomes
By the end of this lesson, you should be able to:
- Define the function of software in a computer system
- Distinguish between an operating system and an application system
- List different types of operating systems and application software
- Define what are programming languages
- Identify and avoid computer viruses
- Compare different character sets
- Identify general trends in software development

What are the Types of Software?
There are two sets of instructions that a computer must follow:
- General instructions: Systems software or operating system such as DOS, Windows, Unix, and Mac OS
- Specific instructions: Application software for word processing, spreadsheets, library management, etc.
Slide 6

**Operating System**
- An organized collection of system programs which serves as the interface between the user or application and the computer.
- It manages the hardware resources:
  - CPU management to facilitate sharing execution line of processes
  - Memory management to allocate memory resources dynamically
  - I/O management to handle reading and writing devices

Slide 7

**Disk Operating Systems (DOS)**
- Disk Operating System (DOS) is a generic term describing any operating system that is loaded from disk devices when the system is started or rebooted.
- It is not a user friendly OS since users need to memorize commands and use them by typing line by line. This known as a command line interface. Very few end users use DOS nowadays.

Slide 8

**Microsoft Windows**
- A graphical user interface (GUI) originally running on DOS (Windows 3.x) that allows multitasking or the ability to run several programs at the same time.
- The most common versions in use are Windows 2000 and Windows XP.
Slide 9

Other Operating Systems

- IBM OS/2
- Macintosh OS
- UNIX and its different flavors--SCO Unix
- Linux and its different flavors (Open source OS)
- Other proprietary OS

Slide 10

Utilities

- The second classification of system software falls under utility software. Utilities are used to support other software, such as operating systems and applications. Here is an overview of the different categories of utilities.
  - Data Compression Software
  - Disk Management Tools
  - Anti-Virus Software

Slide 11

Applications Software

- A set of instructions designed to perform a specific task. The type of software depends on the application
  - General purpose office software
  - Business management software
  - Special discipline software
  - Other applications
General Purpose Office Software
- Word processing—MS Word, Open Office
- Spreadsheets—Excel
- Database management systems—MS Access, Oracle
- Presentation—PowerPoint
- Desktop Publishing—Adobe PageMaker
- Graphics/Imaging—Corel Draw, Adobe Photoshop

What Is Special Purpose Software?
- Software that is used for specific applications is called special purpose software. Examples are:
  - Library management software—Athena, Library Solutions, Millennium
  - Accounting Software
  - Engineering Applications
  - Architectural Applications
  - Statistical Packages

Library Management Software
- Single function: Handles only one library operation such as cataloging or OPAC
- Integrated: Can perform all or many operations using data from a single database
Open Source Software

- Open source software abounds on the Internet. May be downloaded and used free of charge subject to conditions imposed by the developers. Examples are:
  - LINUX
  - Open Office
  - phpMylibrary
  - Greenstone

What is a Computer Virus?

- Generally a computer virus is defined as a program or a code that gains access without the users' knowledge and/or performs actions not intended by the user, often damaging data and sometimes the whole system in the process.
- Some security experts define viruses separately from worms, and Trojan horses.

How do you protect your Computer and your Data?

- From a Virus, Worm, Trojan Horse
- From other causes
  - Back-up data
  - Use firewall
How are Programs Written?

Programming languages are used to write programs. However, before programs can be written, a thorough systems analysis must be conducted.

What are some Trends and Issues in Software Development?

- Language
- Computers use character sets stored in binary codes. Different scripts use different character sets.
- More user friendly
- Bigger in size because of more sophistication
- More customized
- More Web-enabled
- More open source software

End of Lesson 4 Module 1
Lesson 5: What are the Components of a Network?

Rationale

The convergence of communication systems with computing and other technologies has brought about the digitization of the telephone and other telecommunications networks. Through these networks, computers are now linked with one another, making it possible to communicate and share resources with anyone, anytime, anywhere.
Scope
- What is a network?
- What are the components of a network?
- What are the different types of networks?
- What are the different LAN topologies?
- What is an intranet?
- What is the Internet?
- What are the trends and issues in the development of networks?

Learning Outcomes
By the end of this lesson, you should be able to:
- Define what is a network
- Identify the components of a network and their role in the network
- Describe the different types of networks
- Discuss the different LAN topologies
- Differentiate between WAN and LAN / intranet and Internet
- Identify trends and issues in the development of networks

What is a Network?
A network is a collection of computers and communication hardware and software linked to allow resource sharing and to enable communication.
Slide 6

What are the Components of a Network?
- Hardware
- Communications software
- Data / Information
- Networked / shared resources
- Users

Slide 7

What are the Different Kinds of Networks?
- Local Area Network (LAN)
  - Peer to peer
  - Client Server
- Wide Area Network (WAN)
  - Local
  - National
  - Global

Slide 8

Peer-To-Peer LAN

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Client-Server LAN

Topologies of LANS
Networks can be in different logical layouts or shapes called topologies. The basic LAN topologies are:
- Star – all computers are connected to a server or a hub
- Ring – all computers are connected in a continuous loop
- Bus – all computers are connected to a common channel

Token Ring Topology
Slide 12

Star Topology

- Server
- Client
- Printer

Slide 13

Bus Topology

- Server
- Printer
- Clients

Slide 14

What is a WAN?

A WAN is a computer network that has more than one file server and which covers a bigger geographical area than a room or a building. Local area networks grouped together form a WAN. They are connected in several ways through gateways, routers, and other networking and internetworking devices.
Slide 15

Applications

- Business applications
- Communications
- Online information services
- Internet applications
- Academic applications

Slide 16

What is an Intranet?

An intranet is an internal corporate network that provides access to information and allows communication, but limited to within an organization.

Slide 17

What is the Internet?

The Internet has many networks connected to it. It is a global network. It is open for access by many organizations. Its mission is not limited to one organization alone but caters to the entire world.
What are some Trends and Issues confronting Networks?
- Security
- Intellectual Property Rights
- Copyright
- Information Resources
- Privacy
- Technological limitations

End of Lesson 5 Module 1

Lesson 6: What is the Internet?

Module 1 Introduction to Information and Communication Technologies

Lesson 6 What is the Internet?
**Rationale**

The Internet is the global information network. Librarians must understand how it works and must be able to use it in accessing, organizing, publishing and delivering information.

**Scope**

- What is the Internet?
- What Internet tools are available?
- What is the World Wide Web?
- What is e-mail? FTP? Chat?
- What are online information resources?
- Why is the Internet important to libraries?
- What are some issues and concerns in using the Internet?

**Learning Outcomes**

By the end of this lesson, you should be able to:

- Define what is the Internet and other Internet concepts and terms.
- Describe Internet tools and services.
- Identify information resources for libraries on the Internet.
- Use online information resources on the Internet.
- Realize the importance of Internet to libraries.
- Discuss some issues and concerns regarding the use of Internet in libraries.
What is The Internet?

- The Internet is a global network of computers communicating under one set of guidelines, formally called Transmission Control Protocol/Internet Protocol (TCP/IP).
- The Internet is not a specific place, company, or service, although places, companies and services are accessible via the Internet. Nobody owns the Internet. It is also called the Web.

The Internet

The Internet is more than a physical network of wires linking individual computers to one another. It is also a network of people and information resources.

How do you Connect to the Internet?

To have access to the Internet you need:
- a personal computer with a network card
- a modem
- a telephone line or DSL or cable
- an Internet Service Provider
Web Components
- Web servers
- Web browsers
- Search engines
- Hypertext Transfer Protocol
- Hypertext Markup Language
- Uniform Resource Locators (URL) and Web pages
- Information resources

Web Browsers and Servers
1. User sends request
2. Browser interprets user’s selection and makes request from appropriate server.
3. Server accepts and processes request from browser.
4. Server sends requested files to browser to be interpreted.
5. User receives file

HTTP and HTML
- Web servers and browsers use HyperText Transfer Protocol (HTTP), an Internet-standard protocol, to handle the transfer of text and other files between different computers.
- HTTP “defines how messages are formatted and transmitted, and what actions web servers and browsers should take in response to various commands.”
- HTML defines how web pages are formatted and displayed by web browsers
The World Wide Web

- The World Wide Web (WWW) is the collective name for all the computer files in the world that are accessible through Internet web servers.
- The files are accessible through the use of HyperText Transfer Protocol (HTTP), HyperText Markup Language (HTML), browsers, and the Uniform Resource Locator.

Domain Name Server (DNS)

- The Domain Name System converts host names (web server) and domain names into IP addresses on the Internet or on local networks that use the TCP/IP protocol.
- An example of a DNS is: mail.cslib.upd.edu.ph
  Its IP address 165.220.19.30

Hypertext Links between Web Resources

- Hyperlinks are special HTML codes included in web pages that connect web resources, instruct the browser to fetch a resource, run an application or jump to another site.
- Hyperlinks consist of the following:
  - HTML tags - instruct web browser and web servers what file to get or what program to run, include URL’s and/or pointers to applications and files to run
  - Anchor – text or image used to place a hyperlink, the clickable object that activates the hyperlink
  - Uniform Resource Locator (URL) – address of web resource
Uniform Resource Locators

The Uniform Resource Locator (URL) is used to locate resources on the Internet. It contains:
- http:// -- for the hypertext transfer protocol
- which may or may not be followed by www
- the Domain Name
- and the location of the file or resource in the computer.
- Example – http://rizal.lib.admu.edu.ph/catalog

Ways to Locate Information

- Net surfing
- Search engines
- Meta-search tools
- Subject directories
- Virtual libraries
- Newsgroups
- Mailing lists (Listservs)
- Library catalogs
- Online databases
- e-journals
- Organizations
- Other services

Information Materials

- Text
- Sound
- Images
- Video
- Animation
- Full-text
- Statistical data
- Abstracts/Indexes
- Software
- Library catalogs
- News and more
Slide 17

Sites with Free Information Materials
- General Reference Materials
  - Encyclopedias
  - Dictionaries and thesauri
  - Almanacs
  - Other
- Books
- Journals
- Specialized Materials
  - Mathematics
  - Language and grammar
  - Literature
  - Science and technology
  - History
  - Library Science

Slide 18

What can you do on the Internet?
- Send messages via Electronic Mail
- Talk/Chat
- Access information via the World Wide Web
- Transfer files (FTP)
- Other

Slide 19

Issues
- Accuracy of documents
- Authority of web documents
- Currency of information
- Limitations in technology
- Credibility of the site where it is published (domain name)
- Copyright and IPR
- Anybody who knows how can publish on the Net.
Why is the Internet Important to Librarians?

- Many information resources may be accessed through the Internet:
  - online library catalogs
  - documents in various formats
  - databases
  - educational and information services
  - Documents can be sent through the Internet (e.g., e-mail, FTP, file-sharing)
  - Librarians can communicate with people using e-mail, chat, newsgroups etc.

End of Lesson 6 Module 1

Lesson 7: What are the Trends and Issues in ICT Development affecting Libraries?
Module 1
Introduction to Information and Communication Technologies

Lesson 7
What are the Trends and Issues in ICT Development affecting Libraries?

Rationale
To enable the librarian/participant make intelligent decisions when considering ICT applications for the library.

Scope
- What are the legal and regulatory issues that affect ICT applications?
- What are the ethical and moral concerns in using ICT?
- What political, social, and economic factors should be considered in using ICT?
- What are the main security issues concerning computer use/Internet access?
- What technological concerns must be addressed when using ICT in libraries?
- What are the main policy issues relating to ICT, and which developments in ICT might affect library services?
Learning Outcomes

By the end of this lesson, you should be able to:

- Identify the trends and issues in ICT developments and applications.
- Be aware of the legal, ethical, moral, social, economic, and technological concerns relating to computer use/Internet access.
- Define various policy issues related to ICT in libraries.
- Recognize developments in ICT that will affect library service.

Trends

- Increasing globalization leading to standardization
- Increasing familiarity by users of ICTs
- Decreasing hardware costs, increasing capability
- Increasing software cost, increasing capability
- Increasing open source software options
- Increasing availability of content in various formats
- Continuing development of the Internet

Issues

- Legal and regulatory
- Moral and ethical
- Political
- Social
- Economic
- Technology
- Language and script
- Security
- Other
End of last Lesson for Module 1
Module 1
An Introduction to Information and Communication Technologies

Student’s Text

Appendix

Appendix 1: List of Activities
Appendix 2: Reading/Reference List
Appendix 3: Glossary
Appendix 1: List of Activities

Lesson 1

Activity 1.1.1
Ask the students to discuss the effects of ICTs in their life. Cite two concrete examples and elaborate.

Activity 1.1.2
Form groups and discuss the effects of ICT developments on your libraries. Focus on what are the problems, possible solutions and opportunities brought by the changes. Wrap it up by asking each group to present to the class as a whole a summary of what was discussed.

Lesson 2

Activity 1.2.1
Ask the students to read more about the history of the computer and its development by reading computer books and magazines. Make a timeline of important events in PC history.

Activity 1.2.2
Before concluding the activity, ask the students to state their opinion about the application of ICTs in libraries in their country.

Lesson 3

Activity 1.3.1
Do the following hands-on exercises.
1. Check if the hardware is connected to an AVR or a UPS that is connected to a power supply.
2. Turn on the AVR or UPS.
3. Switch on the computer by pushing the button marked power. Wait for the computer to finish “booting up.”
4. View the computer’s basic system information flashed on the screen while booting up, e.g. the operating system, processor type, installed RAM (random-access memory) etc.
5. View the computer’s desktop configuration: date & time, volume settings, desktop display options (e.g. background options, screen settings, screen saver options etc.).
6. Use the mouse to shut down the computer.
7. Close the AVR or UPS.
8. Remove the plug from the wall socket.

Lesson 4

Activity 1.4.1

Do the following hands-on exercises. This will also be your assessment for this lesson.

Use an operating system (Windows) (10 points)
1. Open computer.
2. Click on the start button.
3. Choose Windows Explorer and click to open the application.
4. Explore the icons and what you can do with them.
5. Select and move desktop icons. Create a desktop icon.
6. Work with Windows. Recognize the toolbar, menu bar, status bar, scroll bar etc.
7. Reduce a desktop window, enlarge a desktop window.
8. Recognize the different parts of a desktop bar, toolbar, menu bar, status bar, scroll bar.
9. Insert a diskette on the diskette drive. Format the diskette.
10. Create a new folder. Label it with your name.
11. Open the folder by pointing the mouse at it and clicking. You will not see anything in it.
12. Open the "my documents" folder. Choose a file and drag the document to your folder.
13. Open the folder with your name on it.
14. Open the file in the folder by double clicking on it.
15. Save the file in your folder on to your diskette.
16. Drag your folder to your diskette.

Organize files
1. Examine a directory/folder. View some of the attributes: name, size, date when last updated etc.
2. Re-name files and directories/folders.
3. Copy, Move, Paste, Delete files.
4. Make backup copies of data onto a diskette.
5. Use Cut and Paste functions to move files within directories/folders.
6. Use the Find tool to locate a file or a directory/folder.
7. Search by name, date created, file or directory/folder type.
8. Delete directory/folder.

Use a word processing software (10 points)
1. Open a word processing program by pointing and clicking on start, going to programs and then to word.
3. Open a new file.
4. Compose a short description about yourself (about five sentences).
5. Save the file by pointing at the "file" on menu bar and clicking on “save as”. Give the file a name and save in the folder “my documents”.
6. Edit the file by using the icons or the menu under "format."
7. Print the file.
8. Save file onto a diskette.

Use other editing operations
1. Use Insert command.
2. Use Undo command.
3. Use Insert command.
4. Use Select command.
5. Use Copy, Paste, Move commands.
6. Use Search and Replace command.
7. Change fonts, use italics, underlining, and embolding.
8. Use alignment and justification.
9. Use lists.
10. Use templates.
11. Add headers and footers.
12. Create tables.
13. Import objects and resize.
14. Use spell check and grammar check.
15. Save file.
17. Prepare to print.

Use a spreadsheet (10 points)
1. Open a spreadsheet application.
2. Open an existing spreadsheet and make some changes and save.
3. Open several spreadsheets. Close all files one by one.
4. Create a new spreadsheet.
5. Enter numbers in a cell.
6. Enter text in a cell.
7. Enter symbols or special characters in a cell.
8. Enter simple formulas in a cell.
9. Use the Undo command.
10. Select a cell or range of adjacent or non-adjacent cells.
11. Use the Copy and Paste tools to duplicate cell contents in another part of a worksheet.
12. Use the Cut and Paste tools to move cell contents within worksheet.
13. Move cell contents between active worksheets.
14. Move cell contents between active spreadsheets.
15. Delete cell contents in a selected cell range.
16. Insert rows and columns.
17. Modify column width and row height.
18. Delete selected rows or columns.
19. Sort data.
20. Use basic arithmetic and logical formulas in a spreadsheet addition, subtraction, multiplication, and division.
21. Use the sum function.
22. Use the average function.
23. Format cells to display different currency symbols.

**Use a presentation software (10 points)**
1. Open a presentation application.
3. Create a new presentation.
4. Choose a slide layout form.
5. Choose background.
6. Add text.
7. Add an image from an image library.
8. Copy, Move, and Delete text.
9. Use the Copy and Paste tools to duplicate text, to duplicate a slide within the presentation or re-order slides within the presentation.
10. Delete a slide/slides within the presentation. Use formatting commands.
11. Re-size and move text box within a slide.
12. Import images/slides from other files.
13. Re-size and move an image in a slide.
14. Import other objects to slide.
15. Copy an imported object to a master slide.
16. Number the slides.
17. Print slides in various views and output formats.
18. Add/change transition/preset animation effects to slides.
19. View the slide show.
20. Close application.
Lesson 5

**Activity 1.5.1**

Look at a network card and examples of cables and connectors for the different types of cables.

Lesson 6

**Activity 1.6.1**

Hands on exercises in searching the Internet (World Wide Web, using web browsers and using some Internet tools and services).

Lesson 7

**Activity 1.7.1**

Group discussion. Form into groups and list all issues and concerns regarding the use of computers and the Internet in libraries. Elaborate by citing cases and actual situations. Sum up by creating policy guidelines that could be used to address such issues and concerns.

**End of Activities Module 1**
Appendix 2: Reference/Reading List


End of Reference/Reading List Module 1
Appendix 3: Glossary

1. **Access.** Refers to the ability of the user to connect to a database, or Internet service.
2. **Address.** A label that designates the location of data in a storage device.
3. **Applications software.** A program that is designed to perform a specific task.
4. **Arithmetic and logic unit.** That portion of the CPU that performs calculations and logical operations.
5. **ASCII.** The encoding system, the American Standard Code for Information Interchange.
6. **Backup.** Pertains to a procedure or device to make a duplicate of a system or data for future use in the event of loss from the server or hard disk due to various factors.
7. **Barcode scanners.** Hardware used to scan bar codes.
8. **Binary notation.** A base two numbering system used to represent data.
9. **Bit.** A shortened term used for binary digit.
10. **Boot.** The procedure used to start up the computer where the operating system is loaded from the hard disk to the RAM.
11. **Byte.** A group of eight bits used to designate a character, a number or a symbol. It is also used to designate storage capacities, e.g., KB refers to 1000 bytes, MB to 1000 KB, and so on.
12. **CD-ROM.** Compact Disk Read Only Memory, a type of laser disk used for storing data.
13. **Central processing unit.** The component of the computer that interprets instructions.
14. **Communications.** Consists of devices and systems for transmitting data over long distances.
15. **Communication devices.** Hardware used to transmit data from one location to another.
16. **Communications network.** Group of interconnected computers and communications devices that allow data to be communicated back and forth. Examples are local area networks (LANs) and wide area networks (WANs).
17. **Communications software.** A program that allows the computer to emulate a terminal and transfer files from one computer to another.
18. **Compiler.** A software used to convert the source code into the internal code of the computer.
19. **Computer.** A programmable electromechanical machine. Same as central processing unit. Same as processor.
20. **Computer network.** Computers and computer systems that are linked together for purposes of sharing resources. Similar to a communications network.
21. **Computer system.** A term used for the collection of hardware and software that includes the CPU, input devices, output devices, and storage
22. **Data.** A representation of fact.
23. **Data entry.** The encoding of data into machine-readable form.
24. **Database.** The data resource for all computer-based information processing.
25. **Desktop computer.** A personal computer that can be placed on top of a desk but could not be brought along conveniently like a laptop.
26. **Digital.** Refers to information and/or communications signals represented in two states or in binary format—0 and 1 or on and off.
27. **Diskette.** A thin flexible disk made of plastic that is used for the storage of data. Same as floppy disk.
28. **DOS.** Disk Operating System.
29. **Electronic mail.** A communications tool used to send messages to and from computers. Also called e-mail.
30. **Electronic resources.** Any information material that is stored in digital format in any of the secondary storage devices such as hard disk, floppy disk, CD-ROM, etc.
31. **Electronic spreadsheets.** The software that permits recording of data in columns and rows and its manipulation using mathematical operators.
32. **Flatbed scanners.** An input device that produces images of sheets of paper or any flat piece of document.
33. **Hard copy.** A readable printed copy.
34. **Hard disk.** A rigid metallic magnetic storage medium.
35. **Hardware.** The physical devices that make up a computer system.
36. **Icons.** Pictographs that are used in a Windows environment to indicate operations such as copy, save, delete, etc.
37. **ICTs.** Information and communications technologies.
38. **I/O.** Input output devices.
39. **Information.** The output of information processing. Useful data.
40. **Information Society.** A society that is very dependent on information. A society that treats information as a commodity that is necessary for survival.
41. **Information system.** Generally a computer-based system for storing and retrieving data and information.
42. **Input.** Data encoded into the computer for processing.
43. **Input device.** Any hardware used to encode data such as the keyboard or the mouse.
44. **Intellectual property rights.** Recognized legal claim to ownership of recorded or manifested ideas.
45. **Input hardware.** See input device.
46. **Internet.** A global network of computers communicating under one set of guidelines formally called the TCP/IP.
47. **Intranet.** An internal network belonging to an organization that uses TCP/IP with access limited only to members of the organization.
48. **Joystick.** An input device that moves the cursor on the screen by pushing a vertical stick.
49. **K.** An abbreviation for kilo or 1000 as in KB for kilobytes.
50. **Keyboard.** A device for data entry that uses alphanumeric keys.
51. **LAN.** An abbreviation for local area network or a system of computers located within a small area linked together to share resources.
52. **Magnetic disk.** See hard disk.
53. **Mainframe computer.** The second largest computer after the super computer. It is capable of great speeds of processing and large storage.
54. **Memory.** Primary storage or random access memory (RAM).
55. **Microprocessor.** A computer on a single chip.
56. **Minicomputer.** A computer which is smaller than a main frame but bigger than a microcomputer.
57. **MIS.** Management information system. An information system generally designed for managers to aid them in making decisions.
58. **Modem.** (Modulator-demodulator). A data transmission device used to convert digital signals from computers to analog signals used by non-digital transmission lines, and vice-versa.
59. **Monitor.** A cathode ray tube used for display of soft copy output from a computer.
60. **Motherboard.** A microprocessor circuit board that is used to house the microprocessor, memory and other electronic cards used to handle tasks performed by a computer. Also called a system board.
61. **Mouse.** An input device that is moved across a smooth surface to point the cursor at an icon and initiate a particular task by clicking on it.
62. **MS-DOS.** The disk operating system for a desk top.
63. **Multimedia.** Refers to information represented in more than one medium such as text, graphics, animation, video, etc.
64. **Networks.** See computer network.
65. **Online.** Refers to the connectivity of a computer to a network.
66. **Online access.** Pertains to the accessibility of a computer during the information processing cycle as differentiated from off-line.
67. **Operating system.** The program that manages all the tasks performed by the computer.
68. **Output.** Information retrieved from the computer through an output device.
69. **Output device.** The hardware used to produce output from the computer.
70. **Personal computer system.** A microcomputer such as the desktop or the laptop.
71. **Pointing device.** Hardware that is similar to a mouse and a joy stick and used for inputting data.
72. **Processor.** Same as microprocessor or computer.
73. **Primary storage.** The main memory or RAM where all programs and data reside during processing.
74. **Program.** A set of instructions for the computer to perform a particular function. Also called software.
75. **Programmer.** A person who writes a program.
76. **Programming language.** The codes used by programmers in writing
programs. The output of programming is a source code, which is later on compiled by the computer into machine language or object code. Examples are: COBOL, FORTRAN, etc.

77. **RAM.** (Random Access Memory) See primary storage.
78. **ROM.** (Read Only Memory) A storage device that can only be read, not written to.
79. **Software.** Same as program.
80. **Soft copy.** Copy which is displayed on the monitor screen.
81. **Storage device.** Hardware that is used to store data. It usually refers to secondary storage devices such as the hard disk.
82. **Supercomputer.** Largest, fastest computer available.
83. **System software.** Same as operating system.
84. **Touch screen.** An input-output device that is activated by touching the screen of the monitor.
85. **Trackball.** An input device that is a variant of the mouse but looks like an inverted mouse.
86. **User friendly.** Used to describe a user interface that enables the inexperienced user to interact successfully with the computer.
87. **VDT.** (Video Display unit) Similar to the CRT or the monitor.
88. **WAN.** (Wide area network). A network of computer systems that is not confined to a single location.

**CONGRATULATIONS! YOU HAVE JUST FINISHED MODULE 1**
Module 1
Introduction to Information and Communication Technologies (ICTs)

Lesson 1
Why do Librarians need to know about ICTs and acquire Skill in their Use?
Rationale

In Asia, information is recognized as an important resource, but the ICT tools to create, collect, consolidate and communicate information are not yet used in the majority of libraries.
Scope

- What are ICTs?
- What is the impact of ICTs on Society?
- What is the impact of ICTs on libraries and information centers?
- What is the impact of ICTs on the librarian and on library education?
- What are the major trends and issues in libraries that result from ICTs?
Learning Outcomes

By the end of this lesson, you should be able to:

- Identify the impact of ICTs on the work environment in libraries
- Realize the impact of ICTs on information formats, access and delivery
- Recognize ICTs as tools that librarians can and must use to meet the information requirements of users
What are ICTs?

Information
Communication
Technologies

ICTs are the hardware and software that enable society to create, collect, consolidate and communicate information in multimedia formats and for various purposes.
Impact of ICTs on Society

Developments in ICTs have brought about the merger of the computing, information, communications, entertainment and mass media industries, providing a means of exchanging information in the digital format used by computers.
ICTs are in all facets of society.
What is the Response of Industry and Government to the Information Society?

- Increased production and availability of more powerful ICT hardware and software
- Provision of more efficient national and global information infrastructures for more efficient access and delivery of information
- Increased production and publication of multimedia digital information
What is the Impact of ICTs on Libraries and Information Centers?

- ICTs made information creation in digital format possible.
- ICTs made online access and file transfer possible.
- ICTs made networking and sharing of information resources possible.
ICTs have made the transfer of digital information from remote sites possible.
Impact of Digital Information Materials on Libraries

- Digital information can be sent in multiple copies simultaneously over information networks in fractions of a minute or even of a second. There is no need for users with PCs attached to the network to physically go to the library. They can access information via their PCs.

- Digital information can be cut and pasted from one document into another

- Digital information may be free or cheaper than print equivalents

- Digital information often modifies librarians’ roles in various ways
What are the Effects of these Developments on the User Community?

- Increased level of technology literacy
- Increased demand for better and faster access to information
- Aggravation of discrepancies between the information rich and information poor.
What is the Impact of ICT on Librarians and Library Education?

- Need for ICT knowledge
- Need for ICT skills
- Need for ICT tools
- Need for continuous learning in the context of rapidly changing ICTs

*Library schools must integrate ICTs into their curricula and short courses to produce graduates who can cope with the changing work environment.*
What are the Perceived Roles of Librarians in an Information Society?

- **Creators**: developers and producers of information products and services
- **Collectors**: librarians, archivists and records managers
- **Communicators**: information workers, extension workers, subject specialists
- **Consolidators**: reference librarians, information brokers, analysts

*(A Curriculum for an Information Society, 1998)*
What will be the Trends in the Development of Libraries?

The library will:

- be networked
- be stocked with a core collection that is multimedia
- have access to global information
- become digital
- become virtual
Challenges to Libraries

- Collection development
- Resource sharing through networking
- Faster direct communication among scientists and researchers
- Virtual vs. onsite reference services: push and pull technologies
- Better document delivery systems
- Better abstracting and indexing systems
- Availability of full-text materials on the Internet
- Information management vs. collection management
Conclusion

Libraries and librarians must cope with the demands of an information society. Librarians must have the knowledge, skills and tools in handling digital information to be efficient creators, collectors, consolidators and communicators of information. Librarians with the knowledge, skills and tools required of information professionals in an information society will be the key success factors in enabling the library to perform its role as an information support system for society.
Module 1
Introduction to Information and Communication Technologies

Lesson 2
How do Computers Work?
Rationale

The lesson will introduce you to the computer. Your knowledge about the elements of the computer and how they work will enable you to easily understand the later lessons on hardware, software and networks.
Scope

- What is a computer?
- What are the elements of a computer system?
- What are the different types of computer systems?
- What are the components of a data processing cycle?
- What is the role of a computer in the data processing cycle?
- What are some trends in the development of computers?
Learning Outcomes

By the end of this lesson, you should be able to:

- Describe how computers process information
- List the elements of a computer system
- Identify the different types of computer systems and their uses
- Explain the data processing cycle
- Define the role of computers in the data processing cycle
- Be aware of development trends in ICTs
What is a Computer?

- A computer is a machine with electronic and electromechanical parts. It is programmable and is capable of performing the following functions:
  - Accepting data (input)
  - Processing data
  - Generating output (information)
  - Storing data/information
  - Retrieving/sending data/information
How is Data Processed into Information?

Data

Input

Process

Output

Information

Cataloging

Catalog Record

Card Catalog

Filing Process

Storage

Author

Title

Imprint

Subject

Call No.

Accession No.
What is the Role of Computers in the Information Cycle?

- Accept data through input devices
- Process data using microprocessors
- Store data for interactive use in the RAM and for longer periods of storage in the ROM and hard disks
- Output data through output devices.
The Information Processing Cycle

Data Input

Document

Process

Stored Data

Output

New Document
Elements of a Computer System(1)

1. People - the most important part and beneficiary of a computer system, generally categorized as either end-users or developers

2. Procedures - are descriptions of how things are done, i.e. manuals, documentation, …

3. Data/Information - raw facts (data) and processed data (information) that are used to produce the desired result
Elements of a Computer System(2)

4. Hardware - the physical elements of a computer system categorized according to the basic operations they perform: input, processing, output, storage and communications.

5. Software - provides the step by step instructions that tell the computer what to do. Generally software is divided into system software and application software.

6. Communications - refers to the electronic transfer of data from one place to another
How is Data Represented in the Computer?

Computers represent data as two-state systems. This means that the computer recognizes only two numbers, 0 and 1. Larger numbers, letters and special characters are formed using combinations of 0 and 1. Each of these two numbers is called a bit from the words binary digit. The combination of bits to form meaningful characters or numbers is called a byte.
What Coding Schemes are Used to form Meaningful Bytes of Data?

- There are usually 8 bits in a byte. The coding scheme ASCII (As-key) and ASCII-8 or extended ASCII has been adopted as a standard by the US government and by computer manufacturers.
- ASCII can have 128 combinations of 7 bits each, while ASCII-8 can have as many as 1256 combinations
Development of Computers

- The beginning of the commercial computer age began on June 14, 1951 with the delivery of UNIVAC - Universal Automatic Computer - to the US Bureau of Census.
- Prior to this, however, Charles Babbage invented the Difference Engine and conceived of another machine called the Analytical Engine. The latter had all the components of the computer: input, output, processing and storage. Babbage is called the father of computers.
What are the Computer Generations? (1)

- First generation, 1951-1958: Vacuum tubes were used as the internal computer components, punched cards and magnetic tapes for storing data, and machine language for programming.

- Second generation, 1959-1964: Transistors replace vacuum tubes, assembly languages and high level languages replaced machine languages, and the removable disk pack replaced punched cards. Transistors enabled manufacturers to produce smaller computers.
What are the Computer Generations? (2)

- Third generation, 1965-1970: Integrated circuits (ICs) developed. ICs led to the production of even smaller computers called mini computers. Software became more sophisticated.

- Fourth generation, 1971-present. The microprocessor or computer on a chip was developed. This led to Personal Computers (PCs)

- Fifth generation, present and beyond. Includes recent and emerging technologies, (voice recognition, artificial intelligence, neural systems, quantum computers, etc.)
What are the Different Types of Computer Systems?

- In general, computers are sorted according to physical size and processing power.
- The different types are: Supercomputer, Mainframe, Minicomputer, Microcomputer (Desktop, Laptop, Notebook, Palmtop), Microcontroller
What are the Advantages of Using Computers for Data Processing?

- Faster data input, processing and retrieval
- Tireless--can work 24 hours a day, 7 days a week
- Less prone to error
- Produce output requirements easily
- Can send and retrieve data from other computers if in a network
What are some Disadvantages of Using Computers?

- Require skilled manpower for design, programming and data encoding
- Require electricity
- Require air conditioning for non-stop work
- Expensive to acquire and maintain
- Require frequent upgrade due to fast developments in hardware and software
- Require regular staff training
What are some General Trends in Computers?

- Moore’s Law: Computing power doubles approximately every 18 months
- Faster processors
- Bigger storage capacity
- Bigger memory
- Stand alone>>>Network>>>Distributive computing
- Software bloat
- Lower cost
What are some General Trends in Hardware?

- Downsizing and right sizing: Mainframe >>> PC >>> Pocket PC
- Increasing memory: RAM 1MB to at least 256 MB
- Increasing storage: Hard disk now in GB
- Increasing processor speed: PC XT to Pentium 4
- Increasing storage capacity of auxiliary devices. Diskette to high capacity flash disks
What are some General Trends in Software?

- More sophisticated software
- Bigger storage requirement
- Bigger memory requirement
- More user-friendly operating system
  - DOS to Windows
- Use of open-source software
  - Operating system-- Linux
  - Database management system—MRSQL
  - Library Management System—phpMylibrary, WebISIS
Conclusion

Computers are reliable and efficient tools for data processing and information retrieval. There are advantages and disadvantages in using them. The efficiency of these tools is dependent on the specifications of the computer hardware, the software, database design and the user.
Module 1
Introduction to Information and Communication Technologies

Lesson 3
What are the Hardware Components of a Computer?
Rationale

The hardware components are the tangible components of the computer. A knowledge of the tangible components will enable you to understand how the parts relate to one another. It will also help you troubleshoot when you meet problems in operating computers.
Scope

- What is hardware?
- What is an input device?
- What is a processor?
- What is an output device?
- What is a storage device?
- What other hardware is found in a computer?
- What are some general trends in the development of computers?
Learning Outcomes

By the end of this lesson, you should be able to:

- Identify the hardware components of a personal computer system
- List major input and output devices
- Explain the functions of processing, memory, storage and communication devices
- Realize the significance of each hardware component in processing information
- Identify general trends in the development of the different hardware components of a computer
What is Hardware?

- Hardware is the physical component of a computer system. It refers to the electromechanical parts and devices that make up a computer.

- Generally, hardware is categorized according to which of the five basic computer operation it performs:
  - Input devices
  - Processors and memory
  - Output devices
  - Secondary storage devices
  - Communications / networking devices
What are Input Devices?

Input hardware is used to enter data into a computer by encoding via keyboard, direct reading through scanners or pointing devices like the mouse. Input hardware converts data, e.g. text, image, drawings, into a form that a computer can understand and use.
Input Devices

- joystick
- trackball
- hand-held scanner
- mouse
- touch tablet
- keyboard
- flatbed scanner
The Outside and Inside of the Computer Housing

Front

Rear

Inside
Other Components Inside the Housing

The housing or casing protects and holds the parts of the computer together.

Expansion cards are circuit boards that provide more memory or control peripheral devices such as video adapter cards, network interface cards, ...

The system board connects the CPU and other components of the computer.

Bus cables

Power supply
What is the Processor?

The Motherboard houses the processor and other components of the computer.

Intel Celeron Processor
What is Memory?

- The computer’s workspace where application instructions and data are held during operation is called memory, also known as main memory, primary storage or RAM (Random Access Memory).

- The capacity of a memory is important because this is where data and programs are stored while they are active, thus bigger memory means bigger workspace. Whatever data is held in the RAM is erased when the computer is reset or the power is turned off.
The Random Access Memory (RAM)

- The amount of memory available determines the kind of software that can be run and how much data can be manipulated. The available RAM at present is 32 MB, 64 MB, 128 MB, 256 MB or more.
Read Only Memory (ROM)

Aside from the RAM, the computer also has a ROM (Read only memory) which is used to store the boot program and other low-level information that enables the computer to start up and to recognize its hardware parts.
Output Devices

- Hardware used to display/produce the output of the computer system after processing data.
- The output of computer processing is the usable information that the user requires. This information can be presented to the user in a variety of forms, depending on the output device.
Output Devices

Main output devices are monitors for displaying the output and printers for producing a permanent copy.
What are Storage Devices?

- The hardware used to retain data for future use is called a storage device. These devices may be found inside or outside the computer.
- There are different kinds of storage devices. Among these are optical devices (CD-ROM, DVD), and magnetic devices (tapes, disks).
Examples of Storage Devices

- Magnetic: Hard disk, Floppy disk, Zip disk, Jaz disk, tapes
- Optical--CD-ROM, DVD (Digital Versatile Disk)
- Rewritable CDs and DVDs
Communications Devices

- Communications hardware, also called networking devices, is used to extend the processing capabilities of a computer system by providing a means of transferring data and applications from one computer system to another.

- Communications hardware is used to link to existing communication networks like the Internet that allow electronic transfer of information anytime, anywhere.
Communications Channels

- Wired links
  - Twisted-Pair (TP) Wires
  - Coaxial Cable
  - Fiber-optic cables
- Links Without Wires
  - Microwave Signals
  - Communications Satellites
Conclusion

Hardware is the physical part of the computer. Each component performs a specific function that contributes to the performance of the whole system.
Lesson 4
What are the Software Components of Computers?
Rationale

- A computer system is generally composed of hardware and software.
- Hardware comprises the physical components. Software comprises the set of instructions for the computer. Without software, the computer will not be able to perform the tasks that you would like it to do.
Scope

- What is software?
- What are the two kinds of software?
- What is programming?
- What are viruses and how do you deal with them?
- How do computers respond to different character sets?
- What are some general trends in software development?
Learning Outcomes

By the end of this lesson, you should be able to:

- Define the function of software in a computer system
- Distinguish between an operating system and an application system
- List different types of operating systems and application software
- Define what are programming languages
- Identify and avoid computer viruses
- Compare different character sets
- Identify general trends in software development
What are the Types of Software?

There are two sets of instructions that a computer must follow:

- General instructions: Systems software or operating system such as DOS, Windows, Unix, and Mac OS
- Specific instructions: Application software for word processing, spreadsheets, library management, etc.
Operating System

- An organized collection of system programs which serves as the interface between the user or application and the computer.
- It manages the hardware resources:
  - CPU management to facilitate sharing execution time of processes
  - Memory management to allocate memory resources dynamically
  - I/O management to handle reading and writing devices
Disk Operating Systems (DOS)

- Disk Operating System (DOS) is a generic term describing any operating system that is loaded from disk devices when the system is started or rebooted.
- It is not a user friendly OS since users need to memorize commands and use them by typing line by line. This known as a command line interface. Very few end users use DOS nowadays.
Microsoft Windows

- A graphical user interface (GUI) originally running on DOS (Windows 3.x) that allows multitasking or the ability to run several programs at the same time.
- The most common versions in use are Windows 2000 and Windows XP.
Other Operating Systems

- IBM OS/2
- Macintosh OS
- UNIX and its different flavors -- SCO Unix
- Linux and its different flavors (Open source OS)
- Other proprietary OS
Utilities

- The second classification of system software falls under utility software. Utilities are used to support other software, such as operating systems and applications. Here is an overview of the different categories of utilities.
  - Data Compression Software
  - Disk Management Tools
  - Anti-Virus Software
Applications Software

A set of instructions designed to perform a specific task. The type of software depends on the application:

- General purpose office software
- Business management software
- Special discipline software
- Other applications
General Purpose Office Software

- Word processing -- MS Word, Open Office
- Spreadsheets -- Excel
- Database management systems -- MS Access, Oracle
- Presentation -- PowerPoint
- Desktop Publishing — Adobe PageMaker
- Graphics/Imaging — Corel Draw, Adobe Photoshop
What Is Special Purpose Software?

- Software that is used for specific applications is called special purpose software. Examples are:
  - Library management software--Athena, Library Solutions, Millenium
  - Accounting Software
  - Engineering Applications
  - Architectural Applications
  - Statistical Packages
Library Management Software

- Single function: Handles only one library operation such as cataloging or OPAC
- Integrated: Can perform all or many operations using data from a single database
Open Source Software

- Open source software abounds on the Internet. May be downloaded and used free of charge subject to conditions imposed by the developers. Examples are:
  - LINUX
  - Open Office
  - phpMylibrary
  - Greenstone
What is a Computer Virus?

- Generally a computer virus is defined as a program or a code that gains access without the users’ knowledge and/or performs actions not intended by the user, often damaging data and sometimes the whole system in the process.

- Some security experts define viruses separately from worms, and Trojan horses.
How do you protect your Computer and your Data?

- From a Virus, Worm, Trojan Horse
- From other causes
  - Back-up data
  - Use firewall
How are Programs Written?

Programming languages are used to write programs. However, before programs can be written, a thorough systems analysis must be conducted.
What are some Trends and Issues in Software Development?

- Language
- Computers use character sets stored in binary codes. Different scripts use different character sets.
- More user friendly
- Bigger in size because of more sophistication
- More customized
- More Web-enabled
- More open source software
Module 1
Introduction to Information and Communication Technologies

Lesson 5
What are the Components of a Network?
Rationale

The convergence of communication systems with computing and other technologies has brought about the digitization of the telephone and other telecommunications networks. Through these networks, computers are now linked with one another, making it possible to communicate and share resources with anyone, anytime, anywhere.
Scope

- What is a network?
- What are the components of a network?
- What are the different types of networks?
- What are the different LAN topologies?
- What is an intranet?
- What is the Internet?
- What are the trends and issues in the development of networks?
Learning Outcomes

By the end of this lesson, you should be able to:

- Define what is a network
- Identify the components of a network and their role in the network
- Describe the different types of networks
- Discuss the different LAN topologies
- Differentiate between WAN and LAN / intranet and Internet
- Identify trends and issues in the development of networks
What is a Network?

A network is a collection of computers and communication hardware and software linked to allow resource sharing and to enable communication.
What are the Components of a Network?

- Hardware
- Communications software
- Data / information
- Networked / shared resources
- Users
What are the Different Kinds of Networks?

- Local Area Network (LAN)
  - Peer to peer
  - Client Server

- Wide Area Network (WAN)
  - Local
  - National
  - Global
Peer-To-Peer LAN

Printers

Peers

Printers
Client-Server LAN

File Server

Clients

Printer

Print server
Topologies of LANS

Networks can be in different logical layouts or shapes called topologies. The basic LAN topologies are:

- **Star** – all computers are connected to a server or a hub
- **Ring** – all computers are connected in a continuous loop
- **Bus** – all computers are connected to a common channel
Token Ring Topology
Star Topology

Server

Client

Printer
Bus Topology
What is a WAN?

A WAN is a computer network that has more than one file server and which covers a bigger geographical area than a room or a building. Local area networks grouped together form a WAN. They are connected in several ways through gateways, routers, and other networking and internetworking devices.
Applications

- Business applications
- Communications
- Online information services
- Internet applications
- Academic applications
What is an Intranet?

An intranet is an internal corporate network that provides access to information and allows communication, but limited to within an organization.
What is the Internet?

The Internet has many networks connected to it. It is a global network. It is open for access by many organizations. Its mission is not limited to one organization alone but caters to the entire world.
What are some Trends and Issues confronting Networks?

- Security
- Intellectual Property Rights
- Copyright
- Information Resources
- Privacy
- Technological limitations
Module 1
Introduction to Information and Communication Technologies

Lesson 6
What is the Internet?
Rationale

The Internet is the global information network. Librarians must understand how it works and must be able to use it in accessing, organizing, publishing and delivering information.
**Scope**

- What is the Internet?
- What Internet tools are available?
- What is the World Wide Web?
- What is e-mail? FTP? Chat?
- What are online information resources?
- Why is the Internet important to libraries?
- What are some issues and concerns in using the Internet?
Learning Outcomes

By the end of this lesson, you should be able to:

- Define what is the Internet and other Internet concepts and terms.
- Describe Internet tools and services.
- Identify information resources for libraries on the Internet.
- Use online information resources on the Internet.
- Realize the importance of Internet to libraries.
- Discuss some issues and concerns regarding the use of Internet in libraries.
What is The Internet?

- The Internet is a global network of computers communicating under one set of guidelines, formally called Transmission Control Protocol/Internet Protocol (TCP/IP).
- The Internet is not a specific place, company, or service, although places, companies and services are accessible via the Internet. Nobody owns the Internet. It is also called the Web.
The Internet

The Internet is more than a physical network of wires linking individual computers to one another. It is also a network of people and information resources.
How do you Connect to the Internet?

To have access to the Internet you need:

- a personal computer with a network card
- a modem
- a telephone line or DSL or cable
- an Internet Service Provider
Web Components

- Web servers
- Web browsers
- Search engines
- Hypertext Transfer Protocol
- Hypertext Markup Language
- Uniform Resource Locators (URL) and Web pages
- Information resources
Web Browsers and Servers

1. User sends request
2. Browser interprets user’s selection and makes request from appropriate server.
3. Server accepts and processes request from browser.
4. Server sends requested files to browser to be interpreted.
5. User receives file
HTTP and HTML

- Web servers and browsers use HyperText Transfer Protocol (HTTP), an Internet-standard protocol, to handle the transfer of text and other files between different computers.
- HTTP “defines how messages are formatted and transmitted, and what actions web servers and browsers should take in response to various commands.”
- HTML defines how web pages are formatted and displayed by web browsers.
The World Wide Web

- The World Wide Web (WWW) is the collective name for all the computer files in the world that are accessible through Internet web servers.
- The files are accessible through the use of HyperText Transfer Protocol (HTTP), HyperText Markup Language (HTML), browsers, and the Uniform Resource Locator.
Domain Name Server (DNS)

- The Domain Name System converts host names (web server) and domain names into IP addresses on the Internet or on local networks that use the TCP/IP protocol.

An example of a DNS is:
- `mail.cslib.upd.edu.ph`
- Its IP address 165.220.19.30
Hypertext Links between Web Resources

- Hyperlinks are special HTML codes included in web pages that connect web resources, instruct the browser to fetch a resource, run an application or jump to another site.

- Hyperlinks consist of the following:
  - HTML tags - instruct web browser and web servers what file to get or what program to run, include URL’s and/or pointers to applications and files to run
  - Anchor – text or image used to place a hyperlink, the clickable object that activates the hyperlink
  - Uniform Resource Locator (URL) – address of web resources
Uniform Resource Locators

The Uniform Resource Locator (URL) is used to locate resources on the Internet. It contains

- http:// -- for the hypertext transfer protocol which may or may not be followed by www
- the Domain Name
- and the location of the file or resource in the computer.
- Example – http://rizal.lib.admu.edu.ph/catalog
Ways to Locate Information

- Net surfing
- Search engines
- Meta-search tools
- Subject directories
- Virtual libraries
- Newsgroups
- Mailing lists (Listservs)
- Library catalogs
- Online databases
- e-journals
- Organizations
- Other services
Information Materials

• Text
• Sound
• Images
• Video
• Animation
• Full-text
• Statistical data
• Abstracts/Indexes
• Software
• Library catalogs
• News and more
Sites with Free Information Materials

- General Reference Materials
  - Encyclopedias
  - Dictionaries and thesauri
  - Almanacs
  - Other

- Specialized Materials
  - Mathematics
  - Language and grammar
  - Literature
  - Science and technology
  - History
  - Library Science

- Books

- Journals
What can you do on the Internet?

- Send messages via Electronic Mail
- Talk/Chat
- Access information via the World Wide Web
- Transfer files (FTP)
- Other
**Issues**

- Accuracy of documents
- Authority of web documents
- Currency of information
- Limitations in technology
- Credibility of the site where it is published (domain name)
- Copyright and IPR
- Anybody who knows how can publish on the Net.
Why is the Internet Important to Librarians?

- Many information resources may be accessed through the Internet:
  - online library catalogs
  - documents in various formats
  - databases
  - educational and information services
- Documents can be sent through the Internet (e.g., e-mail, FTP, file-sharing)
- Librarians can communicate with people using e-mail, chat, newsgroups etc…
Module 1
Introduction to Information and Communication Technologies

Lesson 7
What are the Trends and Issues in ICT Development affecting Libraries?
Rationale

To enable the librarian/participant make intelligent decisions when considering ICT applications for the library.
Scope

- What are the legal and regulatory issues that affect ICT applications?
- What are the ethical and moral concerns in using ICT?
- What political, social, and economic factors should be considered in using ICT?
- What are the main security issues concerning computer use/Internet access?
- What technological concerns must be addressed when using ICT in libraries?
- What are the main policy issues relating to ICT, and which developments in ICT might affect library service?
Learning Outcomes

By the end of this lesson, you should be able to:

- Identify the trends and issues in ICT developments and applications.
- Be aware of the legal, ethical, moral, social, economic, and technological concerns relating to computer use/Internet access.
- Define various policy issues related to ICT in libraries
- Recognize developments in ICT that will affect library service
Trends

- Increasing globalization leading to standardization
- Increasing familiarization by users of ICTs
- Decreasing hardware costs, increasing capability
- Increasing software cost, increasing capability
- Increasing open source software options
- Increasing availability of content in various formats
- Continuing development of the Internet
Issues

- Legal and regulatory
- Moral and ethical
- Political
- Social
- Economic
- Technology
- Language and script
- Security
- Other
ICT and Libraries

- Collection Development--Print versus electronic information
- Organization of the Collection--Metadata
- Service—e- services: circulation of e-books, e-reserve, self-service systems
- Library automation—Selection of IL system retrospective conversion, etc.
- Organizational issues: ICT department, marketing and promotion, R&D
- Staff recruitment and development: criteria for selection, training programs
- Digitization: selection of materials, archiving
- Technology considerations
- Budget implications