

COURSE INFORMATION

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COURSE TEAM

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INTRODUCTION

Welcome to **LIS 206: Introduction to Information Science**. This is a two-credit (2-CR) unit course which is an elective course for all the undergraduate students in the department of library and information science. It is designed to enable you to explore and apply the strategies that applies to the foundation of information science. The course examined the definition, concepts and essence of information science and all its entirety. Information science is a course that evolved in the early 1950's along with other fields. Information science is the science and practice that deals with the effective collection, storage, retrieval and use of information. Information science borders around how raw data can be transformed to information and then managed. This course will facilitate excellent successful academic journey and enhance your personal development and social status in the community. The course guide tells you briefly what to expect from reading the accompanying study material. It provides you with information on how to make the best use of the materials so that you can achieve good success. Make sure you read it carefully and pay attention to the instructions and suggestions.

WHAT YOU WILL LEARN IN THIS COURSE

This course, LIS 206, titled Introduction to Information Science, has been specifically designed to help you understand the importance of the rich African culture. In this regard, the course will highlight the importance of information in its raw form called data and how it is managed for its users to gain the full benefit of it.

You will learn about information.

You will learn about the brief history of information science.

You will learn about the different theories and models of information science

You will learn about the Five Laws of the Library.

More importantly, you will also learn about information management lifecycle.

INTENDED LEARNING OUTCOMES (ILOs)

By the end of this course, you should be able to discuss any topic in the area of introduction to information science. Specifically, you will be able to:

- i. Define information
- ii. Define Information Science and its characteristics
- iii. Explain the history of information science
- iv. Define Ellis Behavioural Framework
- v. Differentiate between meta-theory, theory and model

- vi. Define Affective Load Theory
- vii. Explain The Big Six Skills
- viii. Explain Ranganathan's Five Laws of Library Science
- ix. Define Information Management Lifecycle and its stages
 - x. Itemize the different stages of Research Lifecycle
- xi. Define Information Processing and its principles
- xii. Define Perception and types of perception
- xiii. Define information overload and its causes
- xiv. Explain the meaning of information security and its components
 - xv. Define Storage and dissemination of information
- xvi. Define Information system and its components
- xvii. Discuss Organisation in the library
- xviii. Define internet and its impact on information science
- xix. Discuss the relationship of information science with other disciplines

WORKING THROUGH THIS COURSE

To successfully complete this course, you are required to participate in both the theoretical and practical parts of the course. You are also to read the study units, listen to the audios and videos, do all assessments, examine the links and read, participate in discussion forums; read the recommended books and other materials provided, prepare your portfolios, and participate in the online facilitation.

Each study unit has introduction, intended learning outcomes, the main content, summary conclusion, and references/further readings. The introduction opens the door to each unit and gives a glimpse of the expectations in the study unit. Read and note the intended learning outcomes (ILOs) which outlines what you should be able to do at the completion of each study unit. This will help you evaluate your learning at the end of each unit to ensure you have achieved the designed learning outcomes. To achieve the intended learning outcomes, the content of each section is presented in modules and units with videos and links to other sources to enhance your study. Click on the links as may be directed but where you are reading the text offline, you may have to copy and paste the link address into a browser. You can download the audios and videos to view offline. You can also print or download the texts and save in your computer or external drive. The unit summaries provide a recapitulation of the essential points in the unit. It's an indispensable brief that garnishes your journey through the unit. The conclusion brings you to the climax of the study and what you should be taking away from the unit.

There are two main forms of assessments – the formative and the summative. The formative assessments will help you monitor your learning. This is presented as in-text

questions, discussion forums and Self-Assessment Exercises. The summative assessments would be used by the university to evaluate your academic performance. This will be given as Computer-Based Test (CBT) which serves as continuous assessment and final examinations. A minimum of three computer-based tests will be given with only one final examination at the end of the semester. You are required to take all the computer base tests and the final examination.

STUDY UNITS

There are 12 study units in this course which are divided into four modules. The modules and units are presented as follows:

Module 1 Basic Concepts of Information Science

- Unit 1 Emergence and Scope of Information Science
- Unit 2 Information Theories and Models of Information Science
- Unit 3 Information Lifecycle

Module 2 Conceptual Structure and Methodology of Information Science

- Unit 1 Principles of Information Processing, Storage and Retrieval of Human Cognition
- Unit 2 Nature and Characteristics of Information Explosion and Overload

Module 3 Perspectives of Information Science

- Unit 1 Perceptions of Information Security in Information Science
- Unit 2 Storage and Dissemination in Information Science
- Unit 3 Information Systems and Evaluation

Module 4 Information Representation in Library Science

- Unit 1 Organisation and Control in Library Science
- Unit 2 Internet and Information Science
- Unit 3 Role of Information in Modern Society
- Unit 4 Relationship of Information Science with other disciplines

PRESENTATION SCHEDULE

The presentation schedule gives you the important dates for the completion of your computer-based tests, participation in forum discussions and at facilitation. Remember, you are to submit all your assignments at the appropriate time. You should guide against delays and plagiarisms in your work. Plagiarism is a criminal offence in academics and liable to heavy penalty.

ASSESSMENT

There are two main forms of assessment in this course that will be scored. First is the set of Tutor-Marked Assignment (TMAs). You are advised to be sincere in attending to the exercises. The second is TMAs. This is the continuous assessment component which is graded. It accounts for 30% of the total scores. You are advised to take this with all seriousness, because it will assist you to pass the course. The TMAs will be given in accordance to the University calendar. Endeavor to strictly adhere to the slated calendar

FINAL EXAMINATION AND GRADING

At the end of the course, you are required to take an examination which will last for a 2-hour duration. It has a value of 70% of the total course grade. The examination will consist of questions that will reflect the type of self-assessment, practice exercises carefully.

Try to use time between the finishing the last unit and sitting for the examination to revise the entire course. You may find it useful to review your Tutor-Marked Assignment or activities before the examination.

COURSE MARKING SCHEME

The following table lays out how the actual course marking is done

Assessment	30% (Undergraduate) 40% (Postgraduate)
Final Examination	70% (Undergraduate) 60% (Postgraduate)
Total	100% of Course work

COURSE OVERVIEW

Introduction to Information Science is a course that touches different aspects pertaining to information and information science. With the advent of the internet information is able to be shared with information professionals worldwide. Information science has a relationship with other disciplines such as chemistry and mathematics because there is hardly anything anyone would do successfully without the input of information. Information science cannot be over emphasized in our daily lives and so this course has vital information to enrich one's knowledge.

HOW TO GET THE MOST FROM THE COURSE

In Open and Distance Learning (ODL), the study units replace the university lecture. This is one of the advantages of ODL. You can read and work through specially designed

study materials at your own pace and at a time and place that is convenient for you. Just as a lecturer may give you classroom exercises, your study units provide exercises for you to do at a particular point in time.

Each of the study units follows a common format. The first item is an introduction to the subject matter of the study unit and how a specific study unit is integrated with the other study and the course as a whole. Following the introduction is the intended learning outcomes which helps you to know what you should be able to do by the time you have completed the study unit. When you are through studying the unit, you should endeavour to go back and check if you have achieved the stated learning outcomes. If you consistently do this, you will improve your chances of passing the course. The main content of the study unit guides you through the required reading from recommended sources.

Tutor-Marked Assignment (TMAs) are found at the end of every study unit. Working through these SAEs will help you to achieve the study units and prepare you for the examination.

You should do every SAE as you come to it in the study units. There will also be examples given in the study units. Work through these when you come to them too.

The following is a practical strategy for working through the course. If you encounter any problem, telephone your tutor immediately. Remember, that your tutor's job is to help you. When you need help, do not hesitate to call and ask your tutor to provide it.

1. The main body of the unit guides you through the required reading and directs you to other sources, if any.
2. Your first assignment in this course is to read this course guide thoroughly.
3. Organize a study schedule: Refer to the course overview for more details. You should note that it is expected of you to devote at least 2 hours per week for studying this course. Note important information such as details of your tutorials, dates for submission of TMAs, exams etc. and write it down in your diary.
4. Once you have created your own study schedule, do everything to stay faithful to it. The major reason that students fail is that they get behind with their course work. If you get into difficulties with your schedule, please let your tutor know before it is too late to help.
5. Turn to Unit 1, and read the introduction and the learning outcomes for unit 1.
6. Assemble the study materials. You will need your references and the unit you are studying at any point in time.

7. As you work through the unit, you will know the sources to consult for further readings.
8. Visit your study centre whenever you need up to date information
9. Well before the relevant due dates (about 4 weeks before the due dates), visit your study centre for your next required assignment. Keep in mind that you will learn a lot by doing the assignment carefully. They have been designed to help you meet the learning outcomes of the course and, therefore, will help you pass the examination. Submit all assignments not later than the due date.
10. Review the learning outcomes for each study unit to confirm that you have achieved them. If you feel unsure about any of the learning outcomes, review the study materials or consult your tutor. When you are confident that you have achieved a unit's learning outcomes, you can start on the next unit. Proceed unit by unit through the course and try to space your study so that you can keep yourself on schedule.
11. When you have submitted an assignment to your tutor for marking, do not wait for its return before starting on the next unit. Keep to your schedule. When the assignment is returned, pay particular attention to your tutor's comments, both on the tutor-marked assignment form and also the written comments on the ordinary assignments.
12. After completing the last unit, review the course and prepare yourself for the final examination. Check that you have achieved the unit learning outcomes (listed at the beginning of each unit) and the course learning outcomes (listed in the Course Guide).

FACILITATION

You will receive online facilitation. The facilitation is learner centred. The mode of facilitation shall be asynchronous and synchronous. For the asynchronous facilitation, your facilitator will:

- Present the theme for the week;
- Direct and summarize forum discussions;
- Coordinate activities in the platform;
- Score and grade activities when needed;
- Upload scores into the university recommended platform;
- Support and help you to learn. In this regard personal mails may be sent;
- Send videos, audio lectures and podcasts to you.

For the synchronous:

- There will be eight hours of online real time contacts in the course. This will be through video conferencing in the Learning Management System. The eight hours shall be of one-hour contact for eight times.
- At the end of each one-hour video conferencing, the video will be uploaded for viewing at your pace.
- The facilitator will concentrate on main themes that are must know in the course.
- The facilitator is to present the online real time video facilitation timetable at the beginning of the course.
- The facilitator will take you through the course guide in the first lecture at the start date of facilitation

Do not hesitate to contact your facilitator. Contact your facilitator if you:

- do not understand any part of the study units or the assignments.
- have difficulty with the self-assessment exercises.
- have any question or problem with an assignment or with your tutor's comments on an assignment.

Also, use the contact provided for technical support.

Read all the comments and notes of your facilitator especially on your assignments; participate in the forums and discussions. This gives you the opportunity to socialise with others in the programme. You can discuss any problem encountered during your study. To gain the maximum benefit from course facilitation, prepare a list of questions before the discussion session. You will learn a lot from participating actively in the discussions.

Finally, respond to the questionnaire. This will help the university to know your areas of challenges and how to improve on them for the review of the course materials and lectures.

SUMMARY

LIS 206, Introduction to Information Science is a course that intends to make you understand:

- Theories and Models of Information Science
- Information Processing
- Information Explosion and Overload
- Organisation in the library
- Information Science and other Disciplines

At the end of the course, you will achieve the objective if you follow the instructions and do what you are asked to do. We wish you success as you adhere strictly to the instructions and advice given to you for this course.

MAIN COURSE

CONTENT

Module 1 Basic Concepts of Information Science

Unit 1 Emergence and Scope of Information Science

Unit 2 Information Theories and Models of Information Science

Unit 3 Information Lifecycle

Module 2 Conceptual Structure and Methodology of Information Science

Unit 1 Principles of Information Processing, Storage and Retrieval of Human Cognition

Unit 2 Nature and Characteristics of Information Explosion and Overload

Module 3 Perspectives of Information Science

Unit 1 Perceptions of Information Security in Information Science

Unit 2 Storage and Dissemination in Information Science

Unit 3 Information Systems and Evaluation

Module 4 Information Representation in Library Science

Unit 1 Organisation and Control in Library Science

Unit 2 Internet and Information Science

Unit 3 Role of Information in Modern Society

Unit 4 Relationship of Information Science with other disciplines

MODULE 1 BASIC CONCEPTS OF INFORMATION SCIENCE

This module introduces the basic concepts of information science such as emergence and scope of information science, theories of information science and information life cycle.

Unit 1: Emergence and Scope of Information Science

Unit 2: Information Theories and Models of Information Science

Unit 3: Information Life Cycle

Unit 1: Emergence and Scope of Information Science

UNIT STRUCTURE

- 1.1 Introduction
- 1.2 Learning outcomes
- 1.3 How did Information Science evolve?
 - 1.3.1 General characteristics of Information Science that are dominant in its evolution and existence
- 1.4 What is Information?
- 1.5 What is Information Science?
 - 1.5.1 Functions of an information scientist
 - 1.5.2 Careers of an information scientist
 - 1.5.3 Qualities of an information scientist
- 1.6 Summary
- 1.7 Glossary
- 1.8 References / Further Reading
- 1.9 Possible Answers to Self-Assessment Exercises

1.1 INTRODUCTION

This unit introduces you to the concept as well as the emergence of information science. It also discusses the scope of information science. The unit further traces the historical evolution of information science and how it has evolved till date.

1.2 LEARNING OUTCOMES

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

- Define Information

- Define information science.
- Define the general characteristics of information science
- Explain briefly, the history of information science.

1.3 How did Information Science evolve?

According to Saracevic (1999), information science became prominent after the aftermath of the Second World War during the 1950s along with other fields such as computer science. The speed in technical and scientific progress were increasing in numbers from the inception of the 20th century and by the middle of the century there was a revolution. “Information Explosion” was the most visible manifestation of the revolution whereby there were publications and records of all kinds of literature.

Information science is better understood by defining information. In Latin, there was a verb *informare* which means “to inform”. According to lexicographer Craige (1932), information which was introduced into English from old French had six other forms being composed at different times namely; *informatioun*, *informacioun*, *informatyoun*, *informacion*, *informacyon* and *informatiod*.

The term ‘information science’ and ‘information scientist’ were first used by **Jason Farradane** in the mid-1950s, he was a British scientist born in Hampstead, London. At first, Farradane’s concept of an information scientist was a specialist who is in charge of technical and scientific information. He championed the teaching of information science as a distinct subject and was among those who argued for a ‘true science of information’, along the lines of natural sciences. (Bawden, 2008).

During the 1950’s – 1980’s which was the early history of information studies, three classical schools were formed, namely;

- The information science originating from computer science.
- The information science originating from library science.
- The information science originating from telecommunication.

1.3.1 General characteristics of information science that are dominant in its evolution and existence:

- Information science is interdisciplinary in nature
- Information science is connected to information technology
- Information science has a strong social and human dimension

1.4 What is Information?

Nazim and Jawid (2004), described information as knowledge, information, communication and data. This can be broken down as follows: -

- Knowledge is what is known already
- Information is what we know, that is shared knowledge

- Communication is the interchange of information through speech, sign or writing.
- Data is any form of documented information.

Wikipedia encyclopedia defines the concept of information as closely related notions of constraint, communication control, data, form, instruction, knowledge, meaning, mental stimulus, pattern, perception and representation.

Madden 2000 cited McCreadie and Rice who reviewed concepts of information that were proposed over the last 50 years and summarized them as thus:

➤ **Information as a representation of knowledge**

Information as a representation of knowledge means information that is stored already for retrieval by people who need them. Books and hard copy journals are the traditional storage mediums but information and communication technology has taken over and electronic media is the new way of storing information.

➤ **Information as data in the environment**

Information as data in the environment explains data that information can be obtained from a variety of environmental stimuli and phenomena; of which some may not necessarily be to convey a message but it ends up being an information.

➤ **Information as part of the communication process**

Information as part of the communication process involves the interaction between two people. Words and data may be exchanged but more importantly, there is a sender and a receiver of information. The timing and social factors are very important in the communication process.

➤ **Information as a resource or commodity**

Information as a resource or commodity explains how information is being transmitted inside a message from the person sending to the person receiving. The receiver of the message interprets the message how he/she understands it and as a result, value may be added as information is being disseminated.

1.5 What is information science?

Information science according to Saracevic (2010), is the science and practice dealing with the effective collection, storage, retrieval and use of information. It is concerned with information and knowledge that can be recorded, as well as related services and technology for their use and management. Zin (2007) carried out an investigation on 50 experts in Delphi and the study was all about the definition of information science. The expert's explanation of information science was categorized in three parts which ranged from "information science is what scientists do" to "information science is a self-serving attempt to ennoble what used to be called library science" to the very broad "information

science is the process of the process of communication and understanding, both intra and inter personally”.

Bates (1999), suggests that information science is a multidisciplinary field of study, involving several forms of knowledge, given coherence by a focus on the central concept of human recorded information. Scholars define information science according to their different orientations and different disciplines. Information science is not restricted to science but rather it tends to be dispersed. For instance, universities in the British Isles in December 2011, spread information science across informatics, business schools, social sciences, arts and social sciences, arts, education and science.

Who is an information scientist?

An information scientist is a professional who is committed to the mission of ensuring and promoting the utilization of existing resources for developmental activities by conquering all obstacles that prevents the user from having the right information at the right time. He went further to describe information science as an attempt to gather various disciplines such as library science, computer science, linguistics, cybernetics and other technologies in order to develop devices that will assist in storage, control and retrieval of information using information communication technology.

Okpokwasili (2008) cited King, Donald et al and grouped information scientists into four different categories namely;

1) The Information Theorist

Information theorists have the duty of researching the nature of information and its relationship to computer technology and human interaction. Their main aim is to seek to create new knowledge about the chain of information transfer and to affect solution to current problems. In other words, information theorists are involved with laws, theories, philosophy and sociology of information science.

2) Information System Specialists

Information system specialists are people who analyze information problems and information needs of groups of people then go ahead and design a system which may be a computer or other equipment to serve those needs. The computer and equipment are meant to solve the needs and problems of users, the information system specialists are to operate them the right way.

3) Information Intermediaries

Information intermediaries is also known as information service personnel. Information intermediaries work between the body of knowledge that is stored and the users who need them. They serve as a middle person between information and user.

4) Information Technologists

Information technologists are people who see to it that the efficient operation of a work space is being maintained. A communication hardware is being used in this instance whereby staff are being instructed on the use of the equipment to ensure that there is a maximum effectiveness of the systems, equipment and processes in library and information.

1.5.1 Functions of an Information Scientist

An information scientist has a number of functions that they carry out in different organisations including the library. Some of the functions as described by Okpokwasili (2008) who cited Donald. D. King. They are: -

i) Managing Information Operations

Information operations involves function like planning and directing of activities, services, finance and budgets. Information operations gives room for policies to be implemented in any organization, promoting information services and products as well as surveying the information needs of the users.

ii) Preparing Data

Preparing data involves writing and editing in journals, manuals and reports in one language or another. Preparing data also involves compilation of bibliographies, preparation of abstracts, catalogues and directories of people and happenings around. Preparing data involves organizing any form of information in readable form.

iii) Searching for Data Information on behalf of others

Many people do not have the information they need at their beck and call so they rely on information scientists to do so. Information scientists search for data information on behalf of others by identification of data sources, assessment of data bases either manually or electronically, evaluation of the results of data searches and referral of users to other sources of data or information.

iv) Education and Training Information Workers

Educating and training information workers involves, imparting knowledge by teaching information subjects / courses. it also involves teaching information scientists on the job, at seminars or at workshops. Training of information workers could take the form of development of information curricular, research and information education.

v) Operational Information Functions

Operational information functions have to do with the supervision of how a library is being run alongside the control and facilitation of procedures for access. Operational

information functions also design application programmes to fit user needs and develop the implementation of software packages for computer systems.

1.5.2 Careers in Information Science

An information scientist can work in different works of life such as;

- a) Academic institutions: Teachers, lecturers
- b) Libraries: Librarians, indexers and abstractors
- c) Data processing centers: Information systems engineer, data base managers and management information specialists
- d) Government: Special librarians, information managers, technical writers and editors
- e) Other areas include banks, hospitals, health care centers, publishers' professional associations and the military

1.5.3 Qualities of an Information Scientist

There are a number of qualities that an information scientist should possess in order to carry out the job well. An information scientist should be;

- a) A good marketer
- b) Have a degree or master's degree in library and information science
- c) Be a member of a professional body affiliated to library and information science
- d) A prolific writer to be able to write articles for publishing
- e) Good in customer care relations because part of his/her duty involves

1.6 SUMMARY

This unit discussed how information science evolved since it was first introduced by Jason Farradane in the mid-1950s. three classical schools were formed in the 1950's to 1980's from claiming that information science originated from computer science, library science and telecommunication. You learnt the various names information science was called until the last name stuck till date. You also learnt that; information science is intertwined with other disciplines thereby adding its quota in other areas not just in the science discipline. Information science is carried out by an information scientist who is familiar with modern day information communication technology (ICT). communicating with users. Having read through this unit, you ought to have grasped a thing or two about information science as a social science discipline which has to do with an information scientist getting the right information, at the right time to the user through the use of information communication technology. Information is a multi-discipline that has to do with representation of knowledge, data in the environment, resource /commodity and as a communication process. careers for information scientist ranges from government organisations, database centers, libraries, hospitals, banks, military and so on. You also learnt that information scientists are grouped into four categories; information technologists, information intermediaries, information system specialists and information theorists.

SELF ASSESSMENT EXERCISE

- i. When did information science become more prominent?
- ii. What are the three classical schools to evolve between the 1950s – 1980s?
- iii. Mention the six ways that information was spelt during the days of old French?

1.7 GLOSSARY

- information science – Information science is the science and practice dealing with the effective collection, storage, retrieval and use of information.
- information scientist - An information scientist is a professional who is committed to the mission of ensuring and promoting the utilization of existing resources for developmental activities by conquering all obstacles that prevents the user from having the right information at the right time.

1.8 REFERENCES / FURTHER READING

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1.9 POSSIBLE ANSWERS TO SELF-ASSESSMENT EXERCISES

- i. 1950's
- ii. The three classical schools are;
 - The information science originating from computer science.
 - The information science originating from library science.
 - The information science originating from telecommunication.
- iii. *informatioun, informacioun, informatyoun, informacion, informacyon and informatiod.*

UNIT 2 INFORMATION THEORIES AND MODELS OF INFORMATION SCIENCES

UNIT STRUCTURE

- 2.1 Introduction
- 2.2 Learning outcomes
- 2.3 Definition of Terms
- 2.4 Ellis' 1994 Behavioural Theory
- 2.5 Affective Load Theory (ALT)
- 2.6 Cheuk Wai – Yi's (1998) Information Seeking and Using Process Model.
- 2.7 Wilsons Model of Information Seeking Behaviour (1999)
- 2.8 Dervin's Sense Making Theory of 1996
- 2.9 The Big Six Skills Model
- 2.10 Ranganathan's Laws of Library Science
- 2.11 Summary
- 2.12 Glossary
- 2.13 References / Further Reading
- 2.14 Possible Answers to self – Assessment Exercises within the Context

2.1 INTRODUCTION

This unit introduces you to some of the theories and models in library and information science. It explains the differences between meta-theory, theory and model. This unit explains the different types of models and theories in information sciences. Models are being used by scholars before it can become a theory. Some of these models and theories explain the information seeking behaviour of people. Everyone needs information at one point in time or the other so the models discussed in this unit throws more light on information seeking behaviour.

2.2 LEARNING OUTCOMES

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

- Define Ellis Behavioural Framework
- Differentiate between meta-theory, theory and model
- Define Affective Load Theory (ALT)
- Explain Cheuk Wai – Yi's (1998) Information seeking and Using Process Model
- Wilsons Model of Information Seeking Behaviour (1999)
- Dervin's Sense Making Theory of 1996
- The Big Six Skills Model
- Explain Ranganathans Five Laws of Library

2.3 Definition of Terms

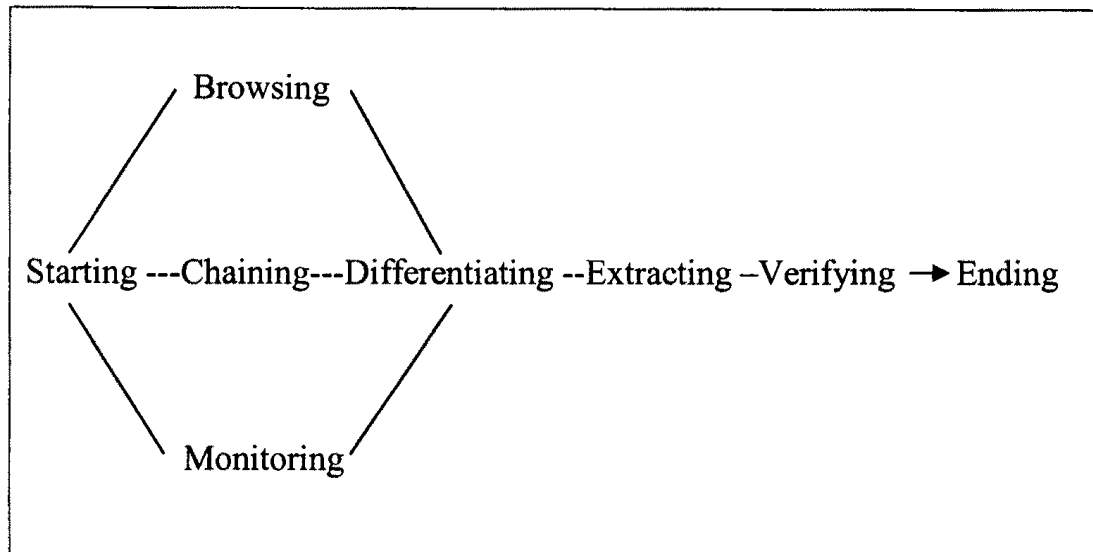
The first and most important thing to do is to distinguish the terms meta - theory, theory and model. These concepts are often times confusing and used interchangeably.

- i) **Meta – Theory :-** Meta – theory is a theory that is concerned with the investigation, analysis or description of theory itself.
- ii) **Theory :-** A theory is a system of assumptions, accepted principles and rules of procedure that are devised to analyze, predict or explain the nature of a behavior of a specified set of phenomena.
- iii) **Model :-** A model is an idea / structures that is still being tested

2.4 Ellis' 1994 Behavioural Framework

An Information seeking behavior model described by Ellis in 1994 has developed into the model of information seeking studies of various researchers from all works of life. In the model below, Ellis derived eight (8) generic characteristics of information seeking behavior patterns of social scientists.

A Stage Process version of Ellis Behavioural Framework



Source: Wilson T.D., 1999. P255.

Figure 1 Stage Process of Ellis Behavioural Framework

The eight (8) characteristics represents the types of activities that the users of information may want to accomplish and it includes: -

a) Starting

The first characteristic in Ellis behavioural model is starting, which involves identifying the initial materials to search through and select starting points for the search. Here, the user selects the sources of information that are relevant to his/her information needs. Some of these sources may be familiar or unfamiliar as the case may be. These sources also help him in finding more relevant sources by means of pointing to, suggest or recommend additional sources and references.

b) Browsing

Browsing is a characteristic that involves a semi-directed searching in an area of potential interest as a monitoring activity going through the scanning of journals and tables of contents etc., to find something that would interest the user.

c) Chaining

Chaining has to do with when the person seeking information, follows the chains of citations or other forms of referential connection between materials to identify new sources.

d) Differentiating

Differentiating characteristics involves activities in which the user ranks the information sources based on their importance and value to the users information need.

e) Monitoring

Monitoring involves searching for the information for current awareness purposes where the user maintains an awareness of developments in the users' field of interest through the monitoring of particular sources.

f) Extracting

The user systematically works through a particular source to locate material of interest in the extracting mode. This implies the selective identification of relevant material in an information source and represents a major feature of the information seeking patterns of many researchers.

g) Verifying

Verifying involves the use of certain criteria or mechanisms when searching for information to make the information as relevant and precise as possible, mainly through computerized literature searches.

h) Ending

The last characteristic which involves tying up loose ends through a final search.

2.5 Affective Load Theory (ALT)

Affective load theory (ALT) is a social – behavioural perspective on the thoughts and feelings of individuals while engaged in information behavior. ALT provides empirical methods for identifying affective states of users that disrupts ongoing cognitive operations. Once a disruptive affective state is identified, coping assistance services can be provided to encourage users to mitigate disruptive states to achieve task success. ALT identifies underlying habits of thinking and feeling while engaging in information behavior, and clarifies the details of information retrieval from a user perspective (Fisher, Erdelez and McKechine, 2005). There are three essential ideas in applying social - behavioural psychology to information behavior:-

- a) The mental capacity of information users both cognitive and affective
- b) Affective behavior initiates, maintains and terminates cognitive behavior
- c) Affective behavior operates within a binary – value system i.e on / off or positive / negative.

2.6 Cheuk Wai – Yi's (1998) Information Seeking and Using Process Model (ISU)

Cheuk Wai – Yi's information – seeking and using (ISU) process model was tested on different professional user groups to illustrate the dynamic and diverse use information seeking behavior. The model states that human information – seeking and using behavior creates the situation that prompts the information need. The ISU model is made up of different situations and information seeking aspects that form the frame work.

The seven situations are:-

- a) Task initiating
- b) Focus forming
- c) Ideas assuming
- d) Ideas confirming
- e) Ideas rejecting
- f) Ideas finalizing
- g) Passing on of ideas

Cheuk Wai –Yi finds in his theory, a relationship between the above mentioned seven situations and information seeking aspects. The model establishes that people move between the seven ISU situations in multidirectional paths.

2.7 Wilsons Model of Information Seeking Behaviour (1999)

Wilson proposed a model in 1981 but later modified it in 1996 which presents a cycle of information activities from the rise of information need to the information use of an information seeker. Wilsons model shows intervening variables such as demographical or psychological variables that help in influencing the information seeking behaviour of the user. Wilsons's opinion of his model says that it is not necessary for every need of the user to lead to information seeking behaviour. This model identifies not only impending personal variables and modes of seeking information but also highlights relevant theories (social learning theory / Risk/ reward theory) of motivations behind the user's search behaviour.

Wilson's 1996 Model of Information Seeking Behaviour

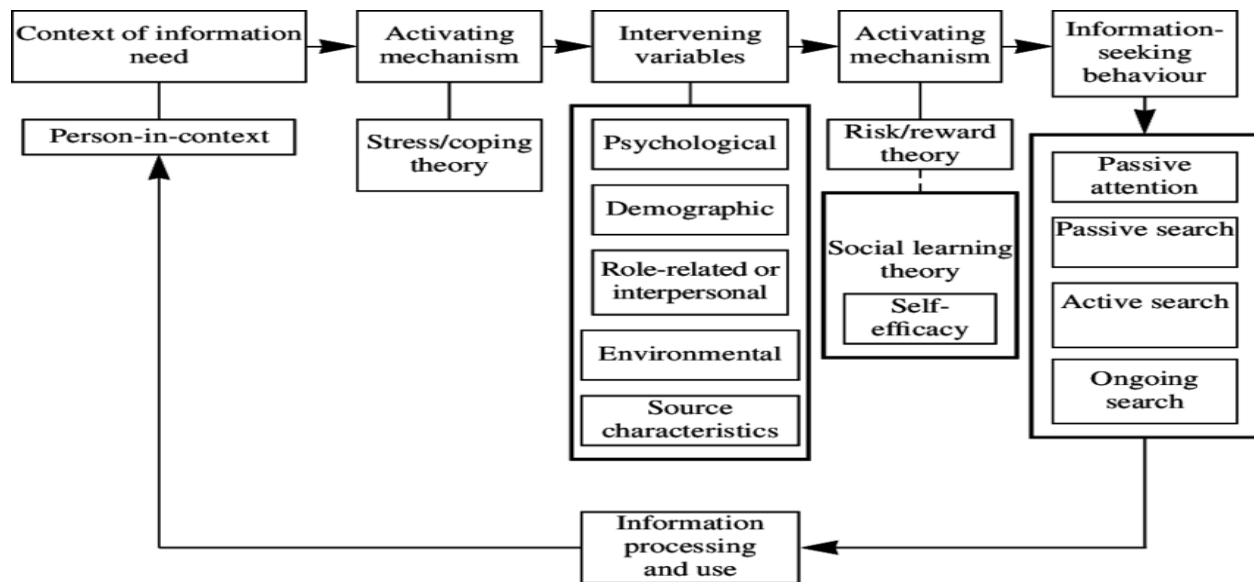


Figure 2 Model of Information Seeking Behaviour

Source <https://www.researchgate.net/profile/Tom-Wilson-17/publication/228784950/figure/fig4/AS:368282289885184@1464816748019/Wilsons-1996-model-of-information-behaviour.png>

In 1999, Wilson's model was commonly known as the **Macro-model**. The model comprises of three important aspects namely;

1. Why information seeking is more likely to occur in response to some needs more than others
2. Why some information sources are more used by the users than others.
3. Why user's opinions of their own competence influences their success in meeting an information goal.

According to Wilson, as feedback of user is necessary aspect of overall information seeking process so in his model, he stresses on information process and invokes a feedback cycle in which he highlights information seeking as iterative at many steps rather than successive (Wilson, 1999).

Wilson's 1999 Model of Information Seeking Behaviour

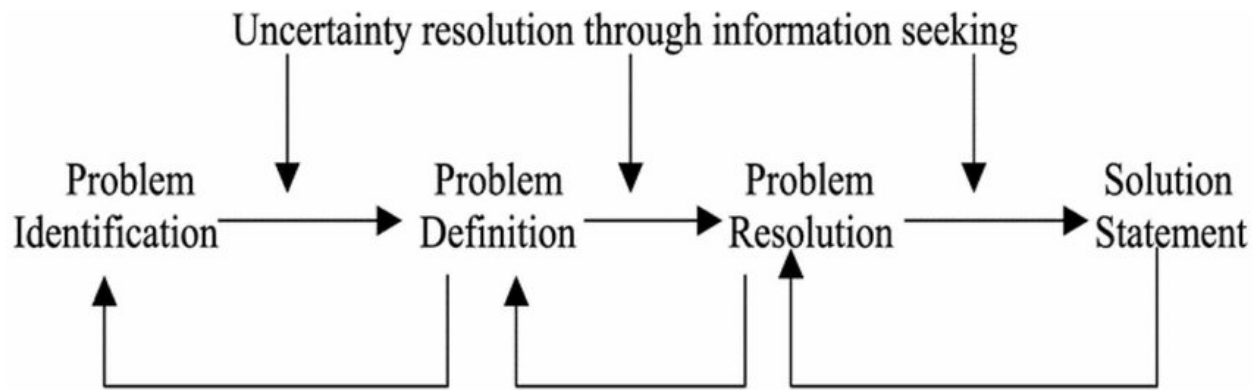


Figure 3 Wilson's 1999 Model of Information Seeking Behaviour

Source <https://www.researchgate.net/profile/Mudasir-Rather-2/publication/318014040/figure/fig3/AS:669554980188165@1536645755809/Wilsons-model-1999-of-Information-Seeking-Behavior-Problem-Solving-Model.jpg>

2.8 Dervin's Sense Making Theory of 1996

Brenda Dervin developed the sense-making theory after years of efforts together and it was proposed in the 1996 in the form. It was called a theory rather than a model and the model states that the theory is a set of assumptions, a theoretic perspective, a methodological approach, a set of research methods, and a practice' designed to handle with information perceived. Dervin theory focuses on four significant aspects of user's information seeking behaviour.

- I. A Situation (Experience, background etc.) in space & time which determines the circumstances in which information problems arise.
- II. A Gap (Doubt, ambiguity etc.) which examines the difference between the contextual situation and the desired situation (e.g ambiguity).
- III. An Outcome (Consequences, impact etc.) that is the result of the Sense-Making process.
- IV. A Bridge (Ideas, Thoughts etc.) which indicates the means and the techniques used for closing the gap between situation and outcome (as cited in Wilson, 1999).

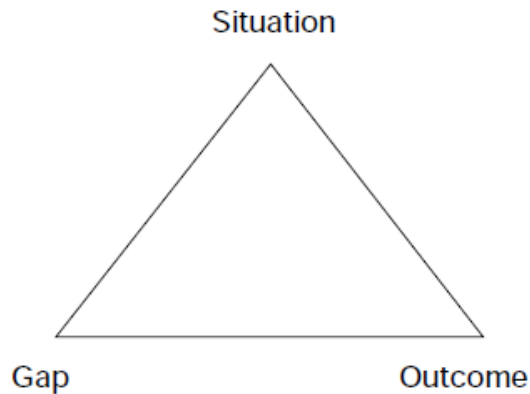


Figure 3 Dervin's Sense Making Theory

Source <https://www.researchgate.net/profile/Tumasch-Reichenbacher/publication/200622119/figure/fig21/AS:669443843698695@1536619258358/The-sense-making-triangle-Gershman-et-al-1999-p-3f-argue-that-the-most-important.ppm>

2.9 The Big Six Skills Model

The big six skills model was proposed by Eisenberg and Berkowitz in 1992. It comprises of six logical steps and represents general approach to information problem solving. The sequence of steps changes along side the different search ventures but each step is necessary for the successful resolution of the information problem.

The steps of the Big Six Skills Model are: -

i. Task definition

Task definition is the first step of the Big Six Model. In this model, a person who needs an information first of all defines the kind of information he needs to get before moving on to the strategies to retrieve the information. Eisenberg and Berkowitz say that most researchers spend less time in understanding and defining the topic, rather, they prefer to proceed to the next steps of information search process. They added that researchers can find solution to their problems more efficiently if they can clearly define and understand the information topic.

ii. Information seeking strategies

The second step of the big six skills is called the information seeking strategies. Information seeking strategies help in decision making that is to select the most appropriate and important source of information among the sea of information available. This second step focuses on the methodology to be followed in order to acquire the learning outcomes of the research topic.

iii. Location and access

Location and access are one of the most important steps of the Big Six Model and it involves the implementation of the information seeking strategy that focuses on inculcating skills for using information access tools. Location and access provide solution that focuses on the overall information problem-solving process rather than limiting it to

a particular situation. Problem solving approach equips researchers to utilize new and unique sources of information.

iv. Use of information

Use of information is handled in a more sophisticated and systematic way. Here, skills like interacting, dialoguing, scanning, questioning, reflecting on information are used to decide what type of information is more valuable and then extract it to satisfy their information need.

v. Synthesis

The fifth step of the Big Six Skill is known as Synthesis. Synthesis is simply converting the collected information into knowledge. Here, the information is extracted, analyzed, restructured, repackaged and applied in new and different forms. Synthesis can be applied by writing formulas or manipulating the gathered information.

vi. Evaluation

Evaluation is last step of the big six skill model whereby the analysis, assessment and examination of the whole information seeking process is carried out at the end. Evaluation determines the usefulness, efficiency and effectiveness of the process.



Figure 4 The Big Six Model

Source

http://www.summit.k12.co.us/cms/lib04/C001001195/Centricity/Domain/606/big_six.png

2.10 Ranganathan's five laws of library science

Dr. S. R. Ranganathan, a first-class Indian library scientist introduced five laws that have theoretical impact to the technological advancements in library and information science (LIS). He was a university librarian and professor of library science at Benares Hindu University of Delhi from 1947 to 1955. Ranganathan was known as the father of library science and he also wrote many LIS textbooks that people use till date. He was the president of the Indian Library Association from 1944 to 1953. He was selected an

honorary member of International Federation for Information and Documentation (FID) in 1957 and was a vice president for life of the Library Association of Great Britain.

The five pillars of Modern Library Management Systems is illustrated in Figure 1 below:-

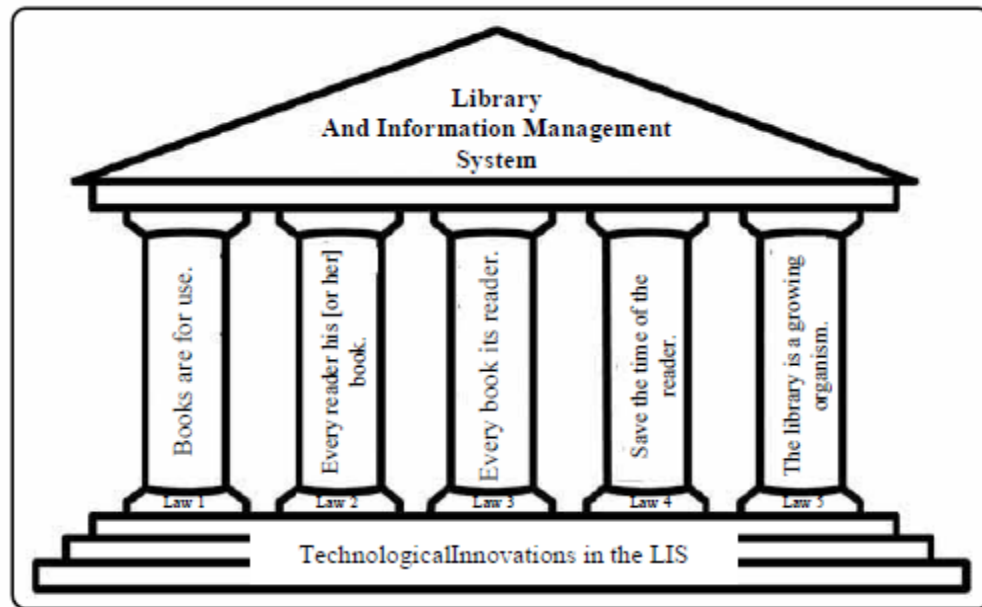


Figure 5 **Five Laws of Library Science**

Source **Illangarathne, (2015). Five pillars of modern library management**

Dr. Ranganathan introduced the five laws to library and information science LIS in 1931. The five laws were accepted as the basic fundamentals of the library management and they are as follows:-

i) Books are for use

Ranganathan's point about the first law; 'books are for use' simply implies that the library resources that are acquired can be accessed by users and can be used. He stressed that libraries are very different from museums in the sense that library resources can be used while museum items cannot be used because they are objects (Gorman, 1998). A library and information science professional is supposed to ensure that users have the right information at the right time, otherwise the whole aim of having a library is defeated (Ali, 2018).

According to Ali (2018), books were once stored to prevent theft but that defeated the purpose why books were actually written because it prevented people from borrowing

or using freely. Dr. Ranganathan asserted that books were written so that things written in them can be used by people and so the library management should ensure that in all ramifications that books are used by people who need them.

ii) Every reader his/ her book

The second law 'every reader hi/her book' simply means that every single person who is a library user has an information resource / library resource that can satisfy their need. In other words, as diverse as users are, the library has as much diverse resources to satisfy their need. In addition, the second law of Dr. Ranganathan stressed that no user should be discriminated irrespective of their age, race or economic status. The librarians are supposed to have first-hand knowledge of the type of library and their clients and stock resources accordingly (Ali,2018).

This law has some obligations namely:-

- a) Obligations of the State
- b) Obligations of the Library Authority
- c) Obligation of Library Staff
- d) Obligation of the Reader

iii) Every book its reader

Dr. Ranganathan's third law 'every book its reader' makes us to understand that when a library user gains access to the library, he/she should be connected to the particular resource in a speedy and practical manner. The library staff are meant to stock up useful, create usable catalogs, provide helpful reference services and do all other things that add up to total library service. In addition the third law implies that every reader i.e every user of the library is entitled to access all collections to the very best service they can provide (Gorman, 1998). It is therefore, necessary to adopt measures to ensure successful implementation of the demand of the third law.

iv) Save the time of the reader

Dr. Ranganathan's fourth law implies that the library users' time must not be wasted in the sense that everything he requires must be within his reach as long as he has reached the library. The library staff must be adequate in number, highly skilled and resources in various formats depending on what the user requires. The implication of Ranganathan's fourth law in marketing library and information services is that it pays more attention to the users benefit and preferences. The law treats the library user as king in the sense that there is effective service delivery from the library staff.

Key areas in saving the time of the user are:-

- a) Open Access in the library
- b) Library should be located at the centre of the institution
- c) Proper shelf arrangement
- d) Classification and cataloging

- e) Reference services
- f) Proper documentation service.

v) The library is a growing organism

Dr Ranganathans fifth law of the library states that ‘the library is a growing organism’. This implies that a library can be likened to an organism. Characteristics of an organism is that it grows from infancy to adulthood. A library is meant to grow in terms of staff, users and resources. Here, older books can be replaced with new books, old methods of cataloguing library resources can be replaced with modern method of cataloguing. Also, the building that houses the library can be refurbished and brought to standard. The fifth law generally focused on all round improvement both internally and externally.

The three (3) key areas where growth can be made in the library are: -

- a) Internal sources
- b) Library users
- c) Employees

Figure 2 below depicts how a library grows.

Areas of Growth in the Library

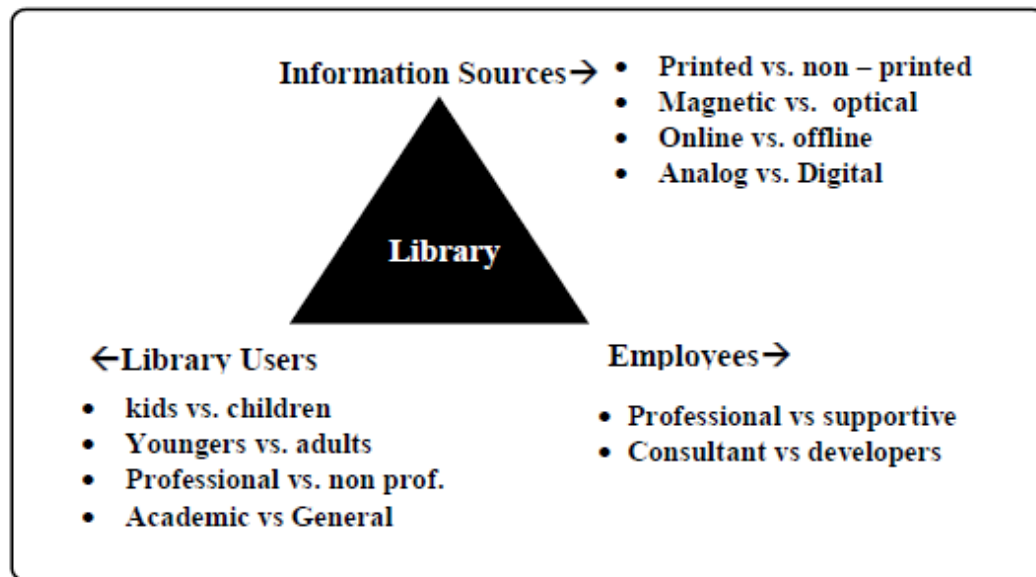


Figure 6 Areas of growth in the library

Source Illangarathne, (2015). Areas of growth in a library.

2.11 SUMMARY

In this unit, you have learnt six different theories and models in information behavior. Though different but the sole aim is information seeking by the user. The models and theories explain different paths as understood and explained by the propounder. Models that have been used over and over eventually become theories. This unit also differentiated meta-theory, model and theory. Ranganathan an Indian library scientist clearly spelt out the five laws of library which are; Books are for use, Every reader his book, Every book its reader, Save the time of the reader and The library is a growing organism. The models and theories of information behavior focuses on the daily lives of users within particular contexts and social settings that could potentially influence users' information behavior. It is evident that each model / theory represents a different nature but also a similar approach to information seeking behavior. Some of the models and theories treated in this unit are ; The Big Six Skill Model, Elli's 1994 Behavioural framework, Affective Load Theory (ALT), Cheuk Wai-Yi's 1998 Information Seeking Behaviour and Wilson's 1999 Model of Information.

SELF ASSESSMENT EXERCISE

1. What is the full meaning of ALT?
2. What is meta-theory?

2.12 GLOSSARY

- The Big Six Skills Model - It comprises of six logical steps and represents general approach to information problem solving. The sequence of steps changes along side the different search ventures but each step is necessary for the successful resolution of the information problem.
- Cheuk Wai – Yi's information – seeking and using (ISU) - Cheuk Wai – Yi's information – seeking and using (ISU) process model was tested on different professional user groups to illustrate the dynamic and diverse use information seeking behavior. The model states that human information – seeking and using behavior creates the situation that prompts the information need.

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2.14 POSSIBLE ANSWERS TO SELF-ASSESSMENT EXERCISES WITHIN THE CONTEXT

1. Affective Load Theory
2. Meta – theory is a theory that is concerned with the investigation, analysis or description of theory itself.

UNIT 3 INFORMATION LIFE CYCLE

UNIT STRUCTURE

- 3.1 Introduction
- 3.2 Learning outcomes
- 3.3 Information Management Lifecycle
- 3.4 Stages of the Information Lifecycle Management.
- 3.5 Benefits of Information Lifecycle Management
- 3.6 Stages of the Research Life Cycle
 - 3.6.1 Idea Development
 - 3.6.2 Funding
 - 3.6.3 Proposal
 - 3.6.4 Conducting
 - 3.6.5 Disseminating
- 3.7 Summary
- 3.8 Glossary
- 3.9 References / Further Reading
- 3.10 Possible Answers to Self-Assessment Exercises Within the Context

3.1 INTRODUCTION

In the previous unit, you learnt about some of the different theories that are available to library and information science discipline. Although not exhaustive but enough for your level. In this unit, you will learn about the five stages of the research lifecycle and all its components.

3.2 LEARNING OUTCOMES

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

- Define Information Management Lifecycle and its stages
- Define what a research lifecycle is all about.
- Itemize the different stages of the research lifecycle
- Explain in detail each section of the research lifecycle

As stated in the introduction, there are five stages of the research lifecycle namely; Idea development, Funding, Proposal, Conducting and Dissemination.

3.3 Information Management Lifecycle

Information lifecycle is a set of stages whereby a record (written document or oral record) typically goes through collection/creation stage to its final stage which is

archiving or destruction stage. All records are very important when they are received and they need to pass through a process to give room for other new records. Information lifecycle is the lifespan of a record that is the duration of the record from birth till death.

Information lifecycle management is therefore the practice of making use of some policies to the effective management of information all through its useful and relevant life. Information lifecycle management includes policies, processes, practices and tools that work together to manage the information effectively for the organisation. (Sharma, 2011).

3.4 Stages of information lifecycle management

Information lifecycle management is divided into five phases namely;

- Creation
- Distribution
- Use
- Maintenance
- Disposition

1. Creation

Another name for the creation stage is called “collection”. This is the first stage of the information lifecycle management which has to do with records from their point of origin. A staff in an organisation or library may be the originator of a record or probably an external body may be the originator of the record. Such record may include correspondence, forms, reports, drawings, computer input and other sources.

2. Distribution

The distribution stage manages the record once it has been created. They are in charge of getting the record to the right recipient whether internal or external. When a record leaves an organisation or library, it is termed “an internal record” but when the record leaves the organisation, it is termed “an external record” and it goes through the whole information lifecycle management.

3. Use

The third stage of the information lifecycle is called Use. Use is a record that assists the organisation in making a decision for the next line of action. When the information is with the right recipient, the person knows what next to do.

4. Maintenance

Maintenance has to do with keeping the record properly so it is prone to hazards. Maintenance includes processes such as filing, retrieval and transfers. Filing involves putting the printed information in an enclosed container, properly arranged and tagged for easy retrieval. Maintenance is necessary especially when a record has to be used for

reference. After use, it should be filed properly again so that any new staff can trace records when properly guided.

5. Disposition

All records and information are not used all the time, some are used less frequently than others. Records that are use less frequently are transferred to the archives to give room for the more frequently used record. The value of almost all records reduces over time. Some records last for some years then it becomes semi-active. Then after some years again, depending on the content of the record it is thoroughly checked if it is valuable to the organisation, if it is no longer valuable to the organisation, it is disposed in an appropriate manner.

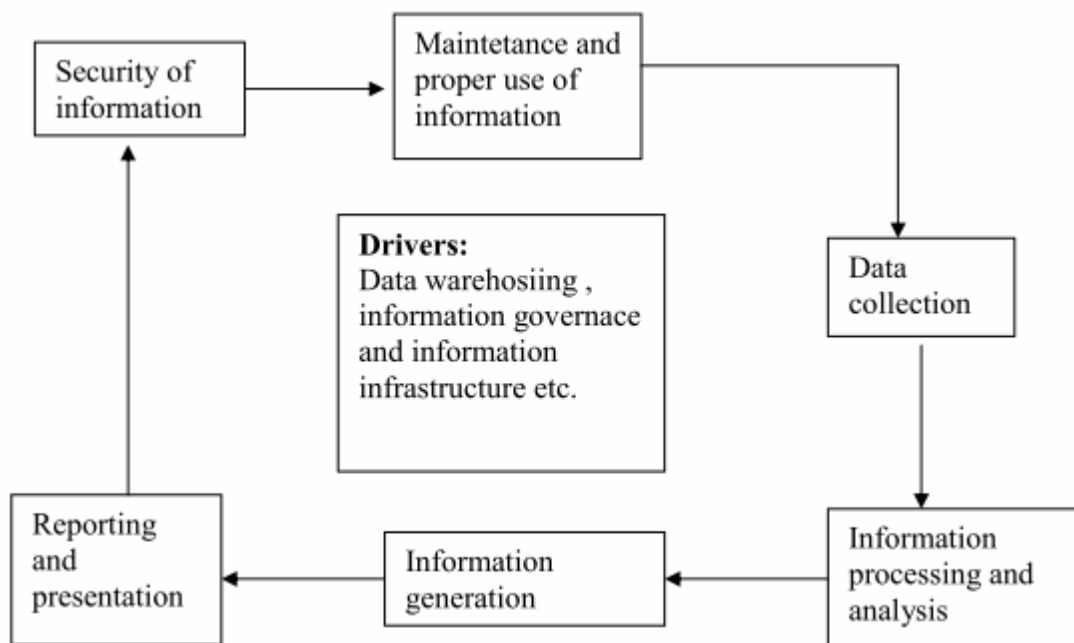


Figure 7 Information Management Lifecycle

Source

<https://www.technicaljournalsonline.com/jers/VOL%20II/JERS%20VOL%20II%20ISSUE%20IV%20OCTOBER%20DECEMBER%202011/ARTICLE%203%20JERS%20VOL%20II%20ISSUE%20IV%20OCT%20DEC%202011.pdf>

Model of Information management lifecycle majorly has to do with Data collection, Information generation, Information processing and analysis, reporting and presentation, Security of information, Maintenance and proper use of information. There are also drivers that includes; Data warehousing, information governance and information infrastructure.

3.5 Benefits of Information Lifecycle Management

Information lifecycle management has some benefits to the organisation or library where it resides. Some of the benefits are: -

1. Reduced Risk

When a record or information as the case may be, is managed effectively, it reduces the risk of getting into wrong hands or missing entirely. Information lifecycle management reduces the risk of using expired information that may cost the organisation a huge loss. Information lifecycle management makes location where a record is, a lot easier.

2. Cost Savings

Information lifecycle management saves the organisation some cost in areas like legal services for holding records, storage costs, reduces duplicate costs and non-value-added information is noticed on time and disposed of.

3. Improved Service

Information lifecycle management improves service of the organisation by shifting services like archiving, eDiscovery, Records management to ILM department while the organisation can focus on customers and executing business strategy.

4. More effective governance

Information lifecycle management indirectly determines the make or break of the organisation if properly handled. It can actually lead to increased bonus of the organisation. ILM brings about more orderliness in the organisation.

3.1 Stages of the Research Life Cycle

Vaughn, Hayes, Lerner, McElfresh, Pavlech, Romito, Reeves and Morris (2013) divided the research lifecycle into five (5) general areas and expanded on library services that support the general areas for instance the traditional role library plays in searching for literature which assists in the development of ideas.

STAGES OF THE RESEARCH LIFECYCLE AND SUPPORTING LIBRARY SERVICES

IDEA DEVELOPMENT	FUNDING	PROPOSAL	CONDUCTING	DISSEMINATING
Find sources	Find funding sources	Prepare data management plan	Manage citations	Select journals

Figure 8 Stages of the research lifecycle and supporting library services
Source Adapted and modified from Vaughn et al., 2013.

3.6.1 Idea Development

The first stage in the research lifecycle is idea development. Idea development is thinking of what to write about. Ideas can be developed by the following;

i) Find background literature

Finding background literature is about going through the pages of a literature review and looking for possible gaps the researcher mentioned or overlooked. Those gaps can form ideas for topics or are complete topics on their own.

ii) Utilize research tools effectively

By utilizing research tools effectively, it means making things a bit easier while researching by making use of Google scholar, Bing and Mendeley. The research tools enables the researcher to search and arrange documents with ease.

iii) Locate data sources

Data sources can be in two forms; the primary data or the secondary data. Primary data includes information that is collected by the researcher purposefully for the research through observations, surveys and focus groups. Secondary data sources includes information that is retrieved from a pre-existing document such as thesis, journals, internet, library searches and so on.

iv) Identify collaborators

Identification of collaborators is when people of like minds come together to meet a need. Collaborators can stem from former classmates or school mates, colleagues at work, members of the same association and so on. People in the same profession can jointly work on a project. In the process of discussions, new ideas are development because people have different ways of seeing things.

3.6.2 Funding

Funding is the process of providing money for the project at hand. When an idea is developed, the next step in the research lifecycle is sourcing for money to carry out the idea. Sourcing for funds can be carried out through different sources such as :-

i) Learn grant seeking tools

Grant seeking tools are institutions, foundations, government, non-governmental association and universities. These bodies give out money/ funds for projects they feel are worthwhile. The researcher applying has to go through a selection process before being selected. A proposal letter has to be submitted alongside the application and an investigation will be carried out by the body. When the body is satisfied , they will communicate to the researcher.

ii) Identify specific grant opportunities

Grant opportunities arise for specific areas where there is dire need for research. Such opportunities are places in university websites and so many

other websites where their target audience will see it and act on it. For example if the grant is on librarianship, the advert will be on Nigerian Library Association website and not on Geosciences website.

iii) Find alternative funding sources

Having exhausted grant opportunities and grant seeking tools without luck, the researcher falls back on finding fund from alternative funding sources. Alternative funding sources includes personal savings, loan from family members and friends, loan from office cooperative and so on. As long as the researcher is convinced about the idea, he/she will definitely find a way to fund it.

3.6.3 Proposal

The third stage of a research lifecycle is the proposal stage. A Proposal is the blue print of your research work. It is a summary of the research work which contains general issues or statement of problem that the researcher intends to address so that a layman can understand it at a glance.

i) Prepare data management

This entails how the data will be collected, preserved and shared. At this point in the research lifecycle the researcher would have made up his/ her mind on whether to make use of primary or secondary data or both. The process of managing the data is what is known as data management.

ii) Describe data

This is the stage where by the data will be explained in detail. Like I mentioned earlier, primary data is data is being gathered by the researcher through observation, surveys and focus groups. While secondary data is data that is gathered from a preexisting document such as thesis, journal or the internet, just to mention a few.

iii) Navigate repository options

Repository options involves selecting the particular repository the researcher plans to deposit his/her work. Many institutions have repositories and it is customary that a staff or student at whatever lever should have their project / thesis or paper in the university's repository to.

3.6.4 Conducting

i) Manage citations

In managing citations, the researcher has to acknowledge the researcher whose work was used to gather information or data. Managing citations has been made easy by the following tools:-

- Cite this for me

- CiteULike
- EndNote
- Mendeley
- Zotero

These websites assist the researcher with correct citation in whatever format they require.

ii) Conduct systematic reviews

In conducting a systematic review, the researcher first of all identifies his/ her research question, thereafter searches for studies that address the questions and critically goes through to extract the information and data that is needed.

3.6.5 Disseminating

i) Select Journals

Journals have different impacts, some are high while others are not so high. The high impact journals have more rating for researchers than the other ones. Journals can be selected according to the fund available to the researcher. Some journals are free, some are published bi-annually, annually and quarterly.

ii) Identify Open Access Journals in the field

Open access journals are journals that are available to all to read and download.

iii) Manage copyright

Copyright is having an exclusive legal right for the research carried out. Managing copyright is

iv) Cite grants

Cite grants is making public the donors of your research work. Citing grants can benefit intending researchers who do not have the resources to carry out the research but have the will power.

v) Track research impact

Tracking of research impact involves reporting your findings and requesting for feedback. Sometimes the donors would want to know the impact of your research, feedback from people can serve as a measurement tool.

vi) Deposit work in digital repository

Once the research work is finished, it's time to put it in the institution's repository or any repository of their choice.

3.7 SUMMARY

This unit explained that research lifecycle is classified into idea development, funding, proposal, conducting and disseminating. This unit concludes that research lifecycle is in five stages and those five stages are sub-divided into different segments.

SELF ASSESSMENT EXERCISE

1. What are the five stages of information life-cycle management
2. What are the sub-stages of idea development

3.8 GLOSSARY

- Information lifecycle - Information lifecycle is a set of stages whereby a record (written document or oral record) typically goes through collection/creation stage to its final stage which is archiving or destruction stage.

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3.10 POSSIBLE ANSWERS TO SELF-ASSESSMENT EXERCISES WITHIN THE CONTEXT

- I. Creation, distribution, use, maintenance and disposition.
- II. Find background, utilize research tools effectively, locate data sources and identify collaborators

MODULE 2 CONCEPTUAL STRUCTURE AND METHODOLOGY OF INFORMATION SCIENCE

Unit 1: Principles of Information Processing, Storage and Retrieval of Human Cognition

Unit 2: Nature and Characteristics of Information Explosion and Overload

Unit 1 Principles of Information Processing, Storage and Retrieval of Human Cognition

UNIT STRUCTURE

- 1.1 Introduction
- 1.2 Learning outcomes
- 1.3 Information processing
- 1.4 What is Perception
- 1.5 Types of Perception
- 1.6 The Stage Model
- 1.7 Summary
- 1.8 Glossary
- 1.9 References / Further Reading
- 1.10 Possible Answers to Self-Assessment Exercises within the Context

1.1 INTRODUCTION

Virtually everything in life passes through information processes. When a human receives an information, the most likely thing to happen is a reaction as a result of the information received. What triggers a reaction is how the information was interpreted in one's mind after being processed. Information processing can be done by a machine (computer) or an organism (humans). This unit will also treat different types of perceptions which are vision, sound, touch, taste and so on.

1.2 LEARNING OUTCOMES

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

- Define Information Processing
- Define the principles of information processing

- Define Perception
- Explain the types of perception
- Explain the stage model

1.3 Information Processing

Information processing simply means the change of information by a computer or a person so that it yields a new and more useful information. It is a cognitive learning theory that explains how humans acquire, process, store and retrieve information from ones' memory. Information processing is part of our daily lives every human being is in a position to receive an information, process it and then react. (Jahns, 2006).

General Principles / Assumptions of Information Processing

Information processing is beclouded by some principles and assumptions which are very important to its existence. Suther (n.d), outlines some principles/ assumptions and they are as follows: -

- i) Assumption of a limited capacity
- ii) Control mechanism is required
- iii) Two – way flow of information
- iv) Genetically prepared to process and organize information in specific ways
- v) Cognitive processes are critical in determining what is learned
- vi) Learning is an internal process that may or may not result in a behavior change
- vii) Inferences can be drawn about cognitive process by observing how people respond to specific stimuli
- viii) Some learning processes are specific to humans
- ix) People are actively involved in their own learning
- x) People are selective about the things they process and learn
- xi) People impose their own meaning on environmental events

1.4 What is Perception

Perception is a set of processes that is used to explain the different stimuli that a human feel depending on how they interpret different sensations. Perception is the organisation, identification and interpretation of an information in order to represent and understand the environment. Perception involves signals from the nervous system which evolves

from physical or chemical stimulation of the sense organs; for example, hearing involves pressure waves. Perception happens effortlessly because it happens outside conscious awareness.

1.5 Types of Perception

Zhang (2019) explained that the human brain can sense different types of perceptions namely: -

a) Vision

Vision is the primary human sense where light is taken in through the eye and it is focused in a way which sorts it on the retina according to the origin. Some processing of texture and movement occurs within the neurons on the retina before the information is sent to the brain.

b) Sound

Sound is also known as hearing or audition. It is the ability to perceive sounds by detecting vibrations. The auditory system includes the outer ears which collect and filter sound waves while the middle ear is used for transforming the sound pressure, and the inner ear which produces neural signals in response to the sound.

c) Touch

Touch perception also known as Haptic perception is the process of recognizing objects through touch. That is a combination of somatosensory perception of patterns on skin surface. When there is pressure, pain or heat via the skin, it is known as touch perception.

d) Taste

Gustation is another term for Taste. It is the ability to perceive flavor of substances including food and other substances. The sensory organ that receives taste is called taste buds or gustatory calyculi. The human tongue has 100 to 150 taste receptor cells on each of its roughly ten thousand taste buds. There are five primary tastes: sweetness, bitterness, sourness, saltiness, and umami.

e) Smell

Smell is the process of absorbing molecules through the olfactory organs. The olfactory organ for absorbing molecules is through the nose. Smell is the process that causes humans to understand the concept of smell from a physical standpoint.

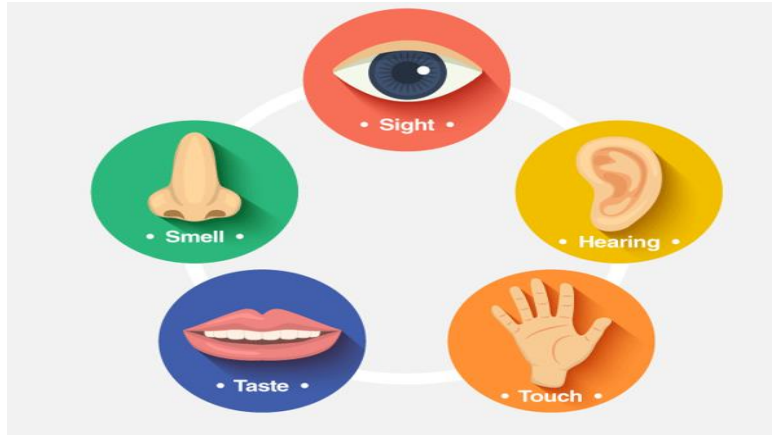


Figure 9 Types of perception

Source <https://cdn1.byjus.com/wp-content/uploads/2019/02/Sensory-Perception.png>

f) Social

Social perception is the part of perception that allows people to understand the individuals and groups of their social world, and thus an element of social cognition. Social perception is the combination of vision, smell and touch perception respectively. It is the part of perception that allows people to understand the individuals and groups of their social world.

1.6 The Stage Model

Atkinson and Shiffrin (1968) founded The Stage Theory and the key elements of this model is that it views learning and memory as **discontinuous** and **multi-staged**. The model states that when a new information is absorbed, it is somehow manipulated before it is stored. The stage Model recognizes three types of stages of memory which are: -

- a.) Sensory memory
- b.) Short – term or working memory
- c.) Long term memory

Figure - A Stage Model of Memory

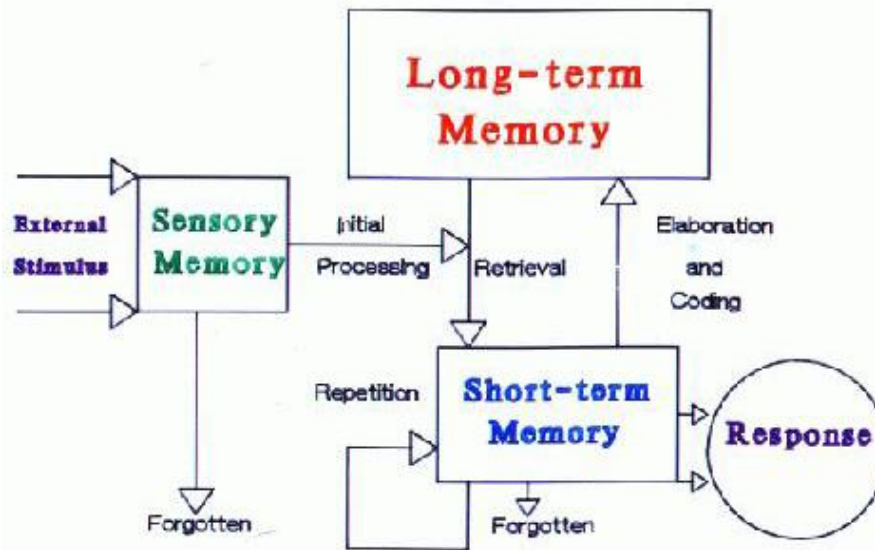


Figure 10 A Stage Model of Memory

Source: https://lh3.googleusercontent.com/proxy/LUHmuYQxUojoE3D8SE1edu3iK3ChdzP-HPlpxaX7sZNJg-og21kI-2C-K4ZFXyWxbm3LVCVjcZiQ9GglBLW1oGqKgcks_XUQmaB7JZpEMasldQ

a) Sensory memory

This is the initial stage of stimuli perception. Sensory memory is associated with the senses and there is a separate section for each type of sensual perception, each with its own limitations and devices. External stimuli is received into the sensory memory and then further processed otherwise they will never become part of the memory store. The sensory memory is temporarily limited in the sense that information that is stored here begins to decay if not quickly transferred to the next stage. The time limit for retaining visual stimuli is half a second and for auditory stimuli it is three seconds. It is believed that stimuli not transferred to the next stage will not be incorporated into memory and will almost be impossible to recall. Two types of sensory memory are: -

- i) **Iconic memory:** - deals with visual stimuli
- ii) **Echoic memory:** - deals with auditory stimuli

b) Short – term or Working memory

Short – term memory can also be called Working memory. This is the second stage of information processing which is often viewed as active or a conscious memory because it is part of a memory that is actively processed while new information is being taken in. Short term memory also has a very limited capacity, whereby an information is not rehearsed it will begin to be lost within 15 – 30 seconds after being taken in.

There are three primary components of the short memory namely: -

- i) **The phonological loop** – allows the storage and rehearsal of verbal information
- ii) **The visuospatial sketchpad** – does the same with visual and spatial patterns
- iii) **The central executive** – regulates the operations of the phonological loop and visuospatial sketchpad

c) **Long - term Memory**

Long term memory is also known as the permanent memory. This is a store house for all previous perceptions, knowledge and information that is learned by an individual. Abbot (2002), suggests that long term memory is a more permanent storage for information which remains unused until it is fetched back into consciousness. Long term memory contains information from around the world, from life's experiences about languages and shapes alongside cumulative experiences which they have had in their lives (Randal, 2007).

1.7 SUMMARY

This unit discussed sensory memory which is temporarily limited if the information is not quickly transferred to the next stage. Sensory memory last from half a second to three seconds otherwise it will be lost permanently. Two major types of sensory memory are iconic memory and echoic memory. The next stage of memory is called the short term or working memory which also has a limited storage capacity from 15 – 30 seconds and its primary components are ; the phonological loop, the visual spatial SketchUp and the central executive. Long -term memory is known as the permanent storage where details can be called up and remembered if need be. The stage takes in all life's experiences and recalls the events. Human beings process information differently according to their ability. Some basic principles or assumptions of information are; control mechanism is required, two-way flow of information, people impose their own meaning on environmental events, just to mention a few. Perception can be described as processes used to explain different stimuli that humans feel, depending on how they interpret the stimuli in their brains. The different types of perceptions are; vision, sound, touch, taste, smell and social perception. The stage model explains three major types of stages of memory namely sensory memory, short memory and long-term memory.

SELF ASSESSMENT EXERCISE

1. List the different types of perceptions.
2. What are the two types of sensory memory?

1.8 GLOSSARY

- Perception - Perception is a set of processes that is used to explain the different stimuli that a human feel depending on how they interpret different sensations

- Long term memory - Long term memory is also known as the permanent memory. This is a store house for all previous perceptions, knowledge and information that is learned by an individual.

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1.10 POSSIBLE ANSWERS TO SELF ASSESSMENT EXERCISES WITHIN THE CONTEXT

- I. Taste, smell, touch, sound and vision.
- II. Iconic memory: - deals with visual stimuli and Echoic memory: - deals with auditory stimuli

UNIT 2 NATURE AND CHARACTERISTICS OF INFORMATION EXPLOSION AND OVERLOAD

UNIT STRUCTURE

- 2.1 Introduction
- 2.2 Learning outcomes
- 2.3 Nature of Information Overload
- 2.4 Causes of Information Overload
- 2.5 Consequences of Information Explosion
- 2.6 Summary
- 2.7 Glossary
- 2.8 References / Further Reading
- 2.9 Possible Answers to Self-Assessment Exercises Within the Context

2.1 INTRODUCTION

In the previous unit, you learnt about the principles of information processing storage and retrieval of human cognition. This unit goes a step further in that line to learn about the nature and characteristics of information explosion and overload.

2.2 LEARNING OUTCOMES

At the end of this unit, you should be able to: -

- Define Information explosion and overload
- Explain the causes of information explosion
- Itemize the effects of information explosion

2.3 Nature of Information explosion

Information explosion can otherwise be known as *too much information*. Shenk 1997, describes information overload as having too much of a good thing. Having too much information at our disposal causes the law of diminishing return to take place in the sense that the glut of information doesn't add value to our life anymore but rather it brings about stress, confusion and even ignorance.

Information used to be as precious as gold but that is not the case today because any kind of information can be found in the internet and the internet is inexpensive and available to all. With the influx of information communication technology, information explosion has been on the speed lane concerning all aspects of life.

Kadiri & Adetoro (2012), defined information explosion as the speedy expansion in the amount of published information. They further explained that information explosion is information that is the overabundance of data to meet ones needs, i.e. there is so much to choose from and it becomes confusing at the end of the day.

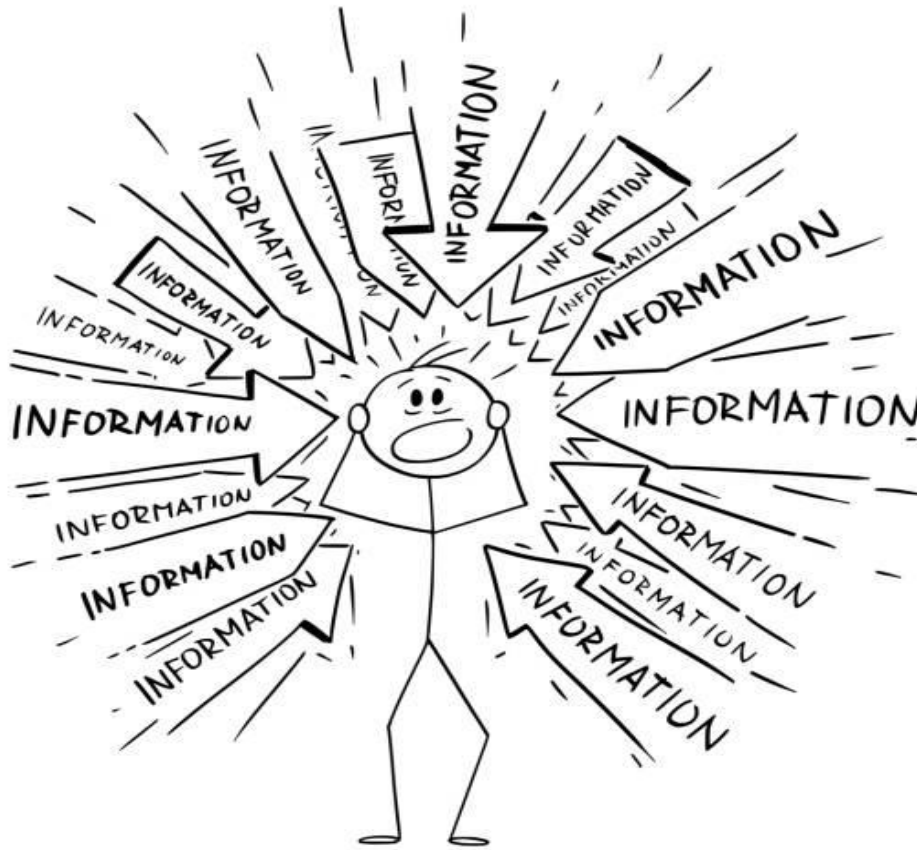


Figure 11 Information Overload

Source <https://media.istockphoto.com/vectors/vector-cartoon-illustration-of-stressed-man-or-businessman-overloaded-vector-id1277426194?k=20&m=1277426194&s=612x612&w=0&h=gzdXXlo6qFjnnLOFUTSHVge2H6okPQGNSeGIK82iMUc=>

Wilson (2001), identified two types of information overload namely:-

i) Personal overload

Personal overload is an instance when someone bites more than he can chew in the sense that he/she takes up more assignment or task than he/she can actually carry out with ease. A situation whereby someone has to break hi/her back or leg in carrying out a task is known as personal overload. At the end of the day, the job will not be well done and the person will suffer from fatigue.

ii) Organisational overload

Organisational overload is a situation whereby the whole staff in the organisation are put under stress and at the end of the day, work will done haphazardly and in an unusual fashion thereby reducing the competence of the staff and reputation of the organisation.

According to Wilson (2001), the scenario of abundant or overabundance of information could be traced to the 17th and 19th century when information became an important input to any human activity. In more recent times, information explosion can be attributed to the publish or perish condition among academics and researchers thereby having so much publication, books and professional journals on the internet (Horjland, 2006).

2.4 Causes of Information overload

Eppler and Menjies (2002), identifies five reasons of information overload which are shown in the diagram below:-

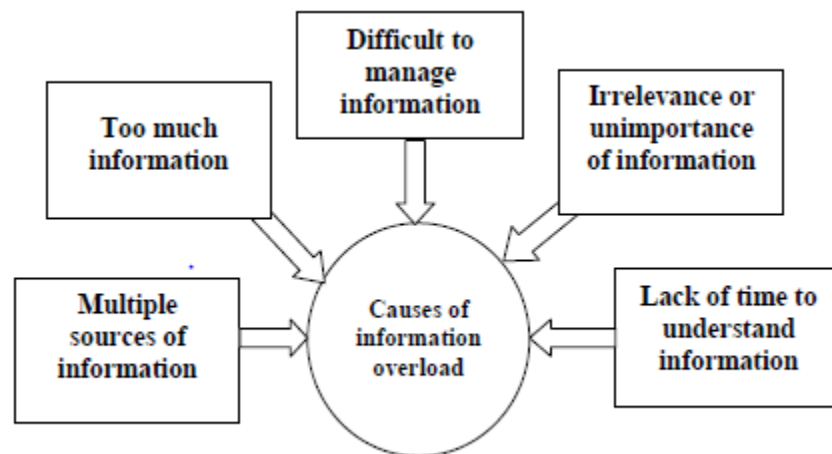


Figure 12 Information Overload
Source Eppler and Menjies 2002

a) Multiple sources of information

When there are too many sources of information, it is confusing because the person will not know which particular information to take. It is good to have more than one source of information, but having too many sources can cause information overload. Things put out there are people opinion about how they see things and so it varies to a great extent unless one is properly guided.

b) Too much information

Having too much information about a particular topic causes information overload. The internet is full of a lot of information so when one has too much information about a topic, he can be rest assured that he has both the useful and not so useful information mixed together. In that case he would need to verify the sources where they were downloaded from.

c) Difficult to manage information

When information that has been downloaded or searched is too much, tendency that it can be properly managed is slim. There are some information that needs to be discarded but if it is kept with useful information, it will end up confusing the person. managing information means organizing of and control over the structure of the information. In addition, information needs to be designed, developed and made to create value, not everyone has that skill.

d) Irrelevance or unimportance of information

When an information is irrelevant and it is stored, it can cause information overload especially when one is searching for an important information and needs to search through all the junk before getting to what he actually needs. For example, the storage device or cabinet can be filled with all sorts of documents, and a particular document is required, valuable time will be wasted before the document is found.

e) Lack of time to understand information

When there is too little time to assimilate an information, the brain will become bombarded with too much information and it invariably causes information overload. For example, if a student has an examination by 9a.m and he is just opening his note for the first time by 6.a.m, the persons' brain will not be able to understand in that short time and that causes information overload.

2.5 Consequences of information explosion

Elson 1999, came up with the following consequences that information explosion can cause and they are: -

i) Despite the large volume of information that is available, one seems to know less because there's too much to read.

This simply means that because there is too much to assimilate, the brain can only take so much and assimilation will seize, the zeal to read through all the information that has been gathered will not be there. Having little information will make one to easily read through but having a large volume of information to read is discouraging from the onset.

ii) Too much information leads to brain freeze or fatigue.

When the brain is loaded with too much information, there is usually a brain freeze or fatigue that is the brain cannot think well for some minutes or hours as the case may be. When the brain is over burdened with information, it can only take so much and then shut down for a while.

iii) Shorter attention span

Humans have different attention span, some have a longer attention span i.e they can concentrate and assimilate for long before the brain takes a break while other attention

span lasts for an hour and that is it for that period. When information is too much, the possibility that the attention span of the individual will be high is certain.

iv) One thinks of the past and immediate future without adequate attention to the present.

Another consequence of information overload is when one thinks of what has happened before and what will happen without paying attention to the present. When information is too much, one is overburdened with information that has already come in previously and what is likely to come in.

v) Information addiction

Some people are information addicts, they always want to know what is happening everywhere and every time. Some people want to know what is happening in the music industry, movie industry and they have work that they need to concentrate on.

vi) Long range thinking stops

Another consequence of information overload is long range thinking stops. Long range thinking stops are when one is comfortably envisioning the future and consciously working towards the future with a timeline in mind.

vii) Information contamination

In order to confront the problem of personal information overload, Elson (1999) further recommends the following: -

a) Take regular information breaks from cell phones, e-mails, newspapers etc

This is very necessary for everyone; it refreshes the whole-body system. Sometimes social media is good but taking a break can reset the brain to assimilate fresh useful things.

b) Call in experts to sift the corn from the shaft

Experts are people who are considered to be more skilled, accomplished, talented, proficient and gifted. They can guide one in choosing useful information from non-useful information. Experts are needed in every organisation to manage information.

c) Serious self-examination of what is right or what is wrong and what is required

When one carefully examines one document after another, it will be easier to detect what is right from what is wrong. Critically examining documents helps to bring out only information that is required.

d) Learn from what others are doing successfully

Taking a cue from colleagues that are successful is usually a good thing to do. Colleagues can share their experience and how they went about sorting out information in order to avoid overload.

e) Invent personal solutions to information overload and if it works for you, share

Many people that are active on social media get to see lots of stuff. People share experiences on how they handled issues such as information overload.

2.6 SUMMARY

This unit has discussed the definition of information overload, types of information overload include personal and organizational. Causes of information overload are; too much information, multiple sources of information, difficult to manage information, irrelevant or unimportant information and lack of time to understand information. Consequences of information explosion are, shorter life span, brain freeze, information addiction, long range thinking stops and information contamination. The problem of information overload is a worldwide phenomenon. With the advent of information communication technology, information overload presents itself in new shapes and dimensions and this is where library and information scientists come in. library and information professionals can help keep the 'information overload' at the minimum by providing information seekers with effective and innovative ways of getting the right information.

SELF ASSESSMENT EXERCISE

- 1) What are the main causes of information overload?
- 2) Mention three consequences of information explosion

2.7 GLOSSARY

- **Personal overload** - Personal overload is an instance when someone bites more than he can chew in the sense that he/she takes up more assignment or task than he/ she can actually carry out with ease.
- **Organizational overload** - Organisational overload is a situation whereby the whole staff in the organisation are put under stress and at the end of the day, work will done haphazardly and in an unusual fashion thereby reducing the competence of the staff and reputation of the organization.

2.8 REFERENCES / FURTHER READING

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2.9 POSSIBLE ANSWERS TO SELF ASSESSMENT EXERCISES WITHIN THE CONTEXT

- I. Multiple sources of information, Difficult to manage information, Lack of time to understand information, irrelevance or unimportance of information and too much information.
- II. Too much information leads to brain freeze or fatigue, shorter attention span and information addiction.

MODULE 3: PERSPECTIVES OF INFORMATION SCIENCE

Unit 1: Perspectives of information security in information science

Unit 2: Storage and dissemination in information science

Unit 3: Information Systems and Evaluation

Unit 1: Perspectives of information security in information science

UNIT STRUCTURE

- 1.1 Introduction**
- 1.2 Learning outcomes**
- 1.3 Meaning of information security**
- 1.4 Components of Information Security**
- 1.5 Information security threats**
- 1.6 Types of New Generation Information Security Threat**
- 1.7 How Information Security can be achieved in Information Science**
- 1.8 Summary**
- 1.9 Glossary**
- 1.10 References/Further Readings**

1.1 INTRODUCTION

In this unit, you will learn about the meaning of information security, components of information security, information security threats and how information security can be achieved in information science.

1.2 LEARNING OUTCOMES

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

- Explain the meaning of information security.
- Describe the components of information security.
- Discuss types of new generation information security threats
- Identify how information security can be achieved in information science

1.3 Meaning of information security

The academic definition of information security is the “preservation of confidentiality, integrity and availability of information. Information security means protecting information (data) and information systems from unauthorized access, use, disclosure, disruption, modification or destruction. It is the process of protecting of assets, resources, data, life or anything that has value. This is the primary goal of information security. The main aims of information security are preventing the loss of availability, the loss of integrity and the loss of confidentiality for systems and data.

2.4 The components of information security

The three pillars of information security are confidentiality, integrity and availability.



Figure 13 Three Pillars of Information Security

Source

https://www.google.com/imgres?imgurl=https%3A%2F%2Fwww.exabeam.com%2Fwp-content%2Fuploads%2Finformation_security_img_1.png&imgrefurl=https%3A%2F%2Fwww.exabeam.com%2Finformation-security%2Finformation-security-policy%2F&tbid=IGKZt_jZvIL-XM&vet=12ahUKEwj2womnt-XyAhUM2xoKHaC6BGAQMygTegUIARDRAQ..i&docid=pwCToC1HSRxB-M&w=700&h=500&q=information%20security%20in%20information%20science%20pdf&ved=2ahUKEwj2womnt-XyAhUM2xoKHaC6BGAQMygTegUIARDRAQ

I. Confidentiality

Maintaining confidentiality means nondisclosure of objects to the unauthorized subjects. Protection of confidentiality is a very important aspect of information security programme. Some examples of information that requires confidentiality include; bank

accounts, personal information, health records and financial records. Some examples of controls that provide confidentiality are access, control, and encryption.

II. Integrity

Integrity means maintaining stoppage of unauthorized modification or alteration of objects by unauthorized subjects. Protection of integrity of objects is an important aspect of information security. Examples are unauthorized change of bank account data, database data, e-mail and information resources. Some examples that provide integrity controls are hosting and charge control.

III. Availability

Availability means ensuring that information objects are available when needed to the authorized subjects. Availability of objects is a critical component of information security. For example, the timely availability of cash at ATM to the authorized account holder. Some examples of controls that provide availability are clustering and Redundant Array of Independent Disks (RAID).

Apart from these components that enhance information security, there are also basic concepts relating to people that use information which include; Identity and Access management. The purpose of identification and access management is to enable the authorized subjects (user, process, robot e.t.c.) to access the right objects (document, system, database etc.) and deny access to unauthorized subjects. Identification, authentication, authorization and accountability (called AAA) are parts of the process.

A. Identification

It is the first important step or process in which the subject, for example, the user has to identify with some identification i.e. username, SSN, email etc. It is very necessary to identify oneself before going to the next step of access. Usernames and emails are private and should not be shared with the public otherwise they will have unauthorized access.

B. Authentication

Authentication is a verification of identity of the subject (user). The subject (user) needs to provide more information like password, pin etc. Compare this information to pre-existing data for this user. Once matching end up in successful authentication, then authorization step begins.

C. Authorization

The user needs permission or authorization to access resources like files, database. The user also needs authorization to create and change resources. Rights and privileges play important role in authorization. Authorization usually requires a code or set of numbers

only known to the authorized persons. If permission is denied, it means the person is not authorized to go further and series of questions will be asked that the intruder may not be aware of.

D. Accountability

The user of the resources is accountable for his movements and actions. Monitoring and logging provide accountability for the movement and action of the users. Accountability is important for successful implementation of security policy.

1.5 Information Security Threats

Information security threats can be anything that can take advantage of a vulnerability to breach security and negatively alters, erase, and harm object or objects of interest. Information security threats are many like software attacks, theft of intellectual property, identity theft, theft of equipment or information, sabotage and information extortion.

Information security threat can attach software, theft of intellectual property, identity theft, theft of equipment or information, sabotage and information extortion.

1. Software attack means attack by viruses, worms, Trojan horses etc on the software. Many authors believe that malware, virus, worms, bots are the same in terms of their threats. They are not the same, but the only similarity is that they are all malicious software that behaves differently.
 - Malware is a combination of two terms- malicious and software. Malware means malicious software that can be intrusive programme code or anything designed to perform malicious operations on a system. It can be divided into two categories;
 1. Infection Methods.
 2. Malware Actions.

Methods of malware infection

Malware can be affected by infection methods such as ; virus, worms, trojan and bots.

- **Virus:** they have the ability to replicate themselves by hooking themselves to the programme on the host computer like songs, video etc and then they travel all over the internet. This virus has a creeper virus which was first detected on ARPANET. Examples include file virus, macro virus, boot sector virus, stealth virus etc.
- **Worms:** Is also self replicating in nature but they don't hook to the programme on the host computer. The difference between virus and worms is that worms are network aware. Worms can easily travel from one computer to another if network is available and on the target machine they will not do much harm, but can only consume hard disk space thereby slowing down the workings of the computer.
- **Trojan:** The concept of Trojan is completely different from the viruses and worms. The name Trojan is derived from the "Trojan Horse" tale in Greek mythology which explains how the Greeks were able to enter the fortified city of Troy by hiding their soldiers in a big wooden horse given to the Trojans as a gift and in the night the soldiers will emerge to attack the city. Similarly, the purpose of the Trojan is to

conceal themselves inside the software that seem legitimate and when that software is executed they will do their task of either stealing information or any other purpose for they are designed.

- **Bots** –: can be seen as advanced form of worms. They are automated processes that are designed to interact over the internet without the need of human interaction. They can be good or bad. Malicious bot can infect one host and after infecting will create connection to the central server which will provide commands to all infected hosts attached to that network called **Botnet**.

Methods of Malware Actions

Malware can be affected by malware actions such as ;

- **Adware** – Adware is not exactly malicious but they do breach privacy of the users. They display ads on computer's desktop or inside individual programs. They can be attached with free to use software, thus main source of revenue for such developers. They monitor your interests and display relevant ads. An attacker can embed malicious code inside the software and adware can monitor your system activities and can even compromise your machine.
 - **Spyware** – It is a program or we can say a software that monitors your activities on computer and reveal collected information to interested party. Spyware are generally dropped by Trojans, viruses or worms. Once dropped they install themselves and sits silently to avoid detection. One of the most common examples of spyware is KEYLOGGER. The basic job of key logger is to record user keystrokes with timestamp. Thus capturing interesting information like username, passwords, credit card details etc.
 - **Ransom ware** – It is a type of malware that will either encrypt your files or will lock your computer making it inaccessible either partially or wholly. Then a screen will be displayed asking for money i.e. ransom in exchange.
 - **Scare ware** – It masquerades as a tool to help fix your system but when the software is executed it will infect your system or completely destroy it. The software will display a message to frighten you and force you to take some action like pay them to fix your system.
 - **Root kits** – are designed to gain root access or we can say administrative privileges in the user system. Once they gain the root access, the exploiter can do anything from stealing private files to stealing private data.
 - **Zombies** – They work similar to Spyware. Infection mechanism is same but they don't spy and steal information rather they wait for the command from hackers.
- 2 **Theft of intellectual property** means violation of intellectual property rights like copyrights, patents etc.

- 3 **Identity theft** means to act someone else to obtain person's personal information or to access vital information they have like accessing the computer or social media account of a person by logging into the account by using their login credentials.
- 4 **Theft of equipment and information** is increasing these days due to the mobile nature of devices and increasing information capacity.
- 5 Sabotage means destroying company's website to cause loss of confidence on part of its customers.
- 6 Information extortion means theft of company's property or information to receive payment in exchange. For example ransom ware may lock victim's file making them inaccessible thus forcing victim to make payment in exchange. Only after payment that victim's files will be unlocked.

1.6 Types of new generation information security threats.

Apart from the old information security threats, there are many new generation information security threats discussed below:

1. **Technology with weak security** – With the advancement in technology, with every passing day a new gadget is being released in the market. But very few are fully secured and follow Information Security principles. Since the market is very competitive, security factor is compromised to make device more up to date. This leads to theft of data/ information from the devices
2. **Social media attacks** – In these cyber criminals identify and infect a cluster of websites that persons of a particular organisation visit, to steal information.
3. **Mobile Malware** – There is a saying that when there is connectivity to the Internet there will be danger to Security. Same goes to Mobile phones where gaming applications are designed to lure customers to download the game and unintentionally, they will install malware or virus in the device.
4. **Outdated Security Software** – With new threats emerging every day, updating in security software is a pre requisite to have a fully secured environment.
5. **Corporate data on personal devices** – These days every organisation follows a rule BYOD. BYOD means bring your own device like Laptops, Tablets to the workplace. Clearly BYOD pose a serious threat to security of data but due to productivity issues organisations are arguing to adopt this.
6. **Social Engineering** – is the art of manipulating people so that they give up their confidential information like bank account details, password etc. These criminals can trick you into giving your private and confidential information or they will gain your trust to get access to your computer to install malicious software- that will give them control of your computer. For example, email or message from your friend that was probably not sent by your friend. A criminal can access your friend's device and then by accessing the contact list he can send infected email and message to all contacts. Since the message/ email is from a known person recipient will definitely check the link or attachment in the message, thus unintentionally infecting the computer.

1.7 How information security can be achieved in information science.

- 1 Protect with passwords:** This may seem like a no brainer, but many cyber-attacks succeed precisely because of weak password protocols. Access to all equipment, wireless networks and sensitive data should be guarded with unique usernames and passwords keyed to specific individuals. The strongest passwords contain numbers, letters and symbols, and aren't based on common place words, standard dictionary terms or easy to guess dates such as birthdays. Each user should further have a unique password wherever it appears on a device or network. If you create a master document containing all user pass codes, be sure to encrypt it with its own pass code and store it in a secure place.
- 2. Design safe systems:** Reduce exposure to hackers and thieves by limiting access to your technology infrastructure. Minimize points of failure by eliminating unnecessary access to hardware and software, and restricting individual users' and systems' privileges only to needed equipment and programs. Whenever possible, minimize the scope of potential damage to your networks by using a unique set of email addresses, logins, servers and domain names for each user, work group or department as well.
- 3. Conduct screening and background checks:** While rogue hackers get most of the press, the majority of unauthorized intrusions occur from inside network firewalls. Screen all prospective employees from the mailroom to the executive suite. Beyond simply calling references, be certain to research their credibility as well .An initial trial period, during which access to sensitive data is either prohibited or limited, is also recommended. It is very necessary to monitor new employees for suspicious network activity.
- 4. Provide basic training:** Countless security breaches occur as a result of human error or carelessness. You can help build a corporate culture that emphasizes computer security through training programmes that warn of the risks of sloppy password practices and the careless use of networks, programmes and devices. All security measures, from basic document disposal procedures to protocols for handling lost passwords, should be second nature to members of your organisation.
- 5. Avoid unknown email attachments:** Never, ever click on unsolicited email attachments, which can contain viruses, Trojan programmes or computer worms. Before opening them, always contact the sender to confirm message contents. If you're unfamiliar with the source, it's always best to err on the side of caution by deleting the message, then potentially blocking the sender's account and warning others to do the same.
- 6. Hang up and call back:** So called" social engineers, "or cons with a gift for gab, often prey on unsuspecting victims by pretending to be someone they're not .If a purported representative from the bank or strategic partner seeking sensitive data calls, always end the call and hang up. Then dial your direct contact at that

organisation, or one of its public numbers to confirm that the call was legitimate. Never try to verify suspicious calls with a number provided by the caller.

7. **Think before clicking:** Phishing scams operate by sending innocent looking emails from apparently trusted source asking for user names, passwords or personal information. Some scam artists even create fake Websites that encourage potential victims from inputting the data themselves. Always go directly to a company's known Internet address or pick up the phone before providing such information or clicking on suspicious links.
8. **Use a virus scanner and keep all software up-to-date:** Whether working at home or in an office network, it pays to install basic virus scanning capability on your PC. Many network providers now offer such applications for free. Keeping software of all types up to date is also imperative, including scheduling regular downloads of security updates, which will help guard against new viruses and variations of old threats.
9. **Keep sensitive data out of the cloud:** Cloud computing offers businesses many benefits and cost savings. But such services also could pose additional threats as data are housed on remote servers operated by third parties who may have their own security issues. With many cloud-based services still in their infancy, it is prudent to keep your most confidential data on your own networks.
10. **Stay paranoid:** Shred everything, including documents with corporate names, addresses and other information, including the logos of vendors and banks you deal with. Never leave sensitive reports out on your desk or otherwise accessible for any sustained period of time, let alone overnight. Change passwords regularly and often, especially if you have shared them with an associate. It may seem obsessive, but a healthy dose of paranoia could prevent a major data breach.

1.8 SUMMARY

This unit has discussed extensively information security, components of information security, information security threats and how information security can be achieved in information science. Information security is different in the new generation than it was in the old generation. You also learnt types of new generation security threats and how information security can be achieved in information science. You have learnt from this study unit, the meaning of information security, three pillars of information security; confidentiality, integrity and availability. Basic concepts components relating to information security are authentication, authorization accountability popularly known as IAAA. Information security threat can attach software, theft of intellectual property, identity theft, theft of equipment or information, sabotage and information extortion. Methods of malware action includes adware, spyware, ransom, scare ware, root kits and zombies. Types of new generation security threats are; Technology with weak security, social media attacks, Mobile Malware, Outdated Security Software and Social Engineering.

SELF ASSESSMENT EXERCISE

1. What are the three pillars of information security?
2. List three information security threats.

1.9 GLOSSARY

- **Information security** - Information security means protecting information (data) and information systems from unauthorized access, use, disclosure, disruption, modification or destruction.
- **Spyware** - It is a program or we can say a software that monitors your activities on computer and reveal collected information to interested party. Spyware are generally dropped by Trojans, viruses or worms. Once dropped they install themselves and sits silently to avoid detection.

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1.10 POSSIBLE ANSWERS TO SELF ASSESSMENT EXERCISES ACCORDING TO THE CONTEXT

- I. Confidentiality, Integrity and availability
- II. Virus, Worms and Trojan.

UNIT 2: STORAGE AND DISSEMINATION IN INFORMATION SCIENCE

UNIT STRUCTURE

- 2.1 Introduction**
- 2.2 Learning outcomes**
- 2.3 Definition of storage**
- 2.4 Importance of Storage in Information Science**
- 2.5 Categories of Online Data Storage**
 - 2.5.1 Advantages and Disadvantages of Online Data Storage**
- 2.6 Offline Data Storage**
 - 2.6.1 Advantages and Disadvantages of Offline Storage**
- 2.7 Information dissemination in information science**
- 2.8 Summary**
- 2.9 Glossary**
- 2.10 References/Further Readings**
- 2.11 Possible Answers to Self-Assessment Exercises Within the Context

2.1 INTRODUCTION

Information is increasingly important in our daily lives. We have become information-dependent in the 21st century, living in an on-command, on-demand world, which means, we need information when and where it is required. We access the Internet every day to perform searches, participate in social networking, send and receive e-mails, share pictures and videos and use scores of other applications. Equipped with a growing number of content-generating devices, more information is created by individuals than by organisations (including business, governments, and non-profits and so on). Information created by individual's gains value when shared with others. When created, information resides locally on devices, such as cell phones, smart phones, tablets, cameras, and laptops. To be shared, this information needs to be uploaded to central data repositories (data centers) via networks. Although the majority of information is created by individuals, it is stored and managed by a relatively small number of organisations.

This information is stored in different devices and disseminated when the need arises. No one can deny the fact that information dissemination in the current decade is faster than ever before. This is due to the fact that numerous innovative ideas have been turned into realities which affected information dissemination positively.

2.2 LEARNING OUTCOMES

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

- Define Storage
- Discuss types of storage devices.
- Identify categories of offline Data storage
- Identify types of Online Data Storage

2.3 Definition of storage

According to the Oxford dictionary, the word storage is the action or method of storing something for future use. It is the retention of retrievable data on a computer or electronic system (data storage). Storage can be defined as a process through which digital data is saved within a data storage device by means of computing technology. Storage can also be defined as a mechanism that enables a computer to retain data, either temporarily or permanently. Data storage is the recording (storing) of information (data) in a storage medium.

Deoxyribonucleic Acid (DNA) and Ribonucleic Acid (RNA), handwriting, phonographic recording, magnetic tape and optical discs are all examples of storage media. Recording is accomplished by virtually any form of energy. There are two types of storage; primary and secondary storage.

1. **Primary storage (volatile storage):** This type of storage requires a continuous supply of electricity (energy) to store or retain the data. It acts as a computer's primary storage for temporarily storing data. Examples are Cache Memory and Random Access Memory (RAM).

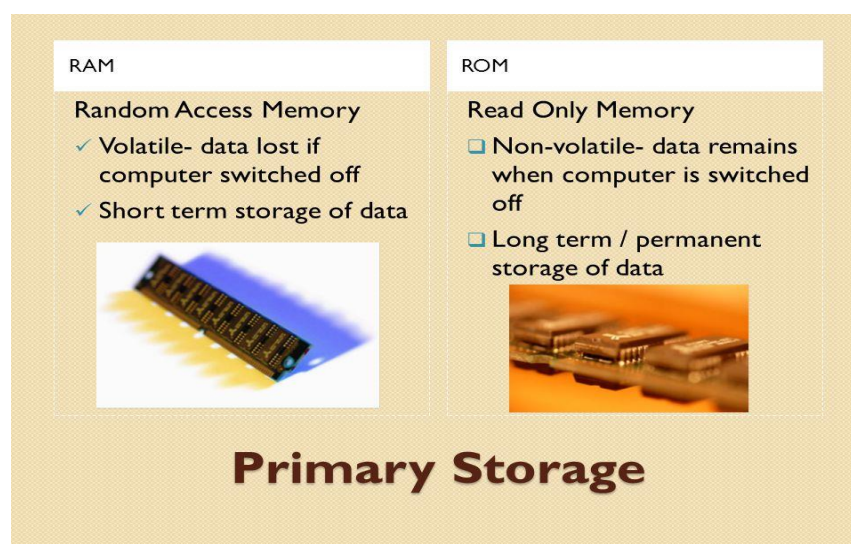


Figure 14 Primary Storage

Source

<https://slideplayer.com/slide/6035332/20/images/4/Primary+Storage+Random+Access+Memory.jpg>

2. **Secondary storage (non-volatile storage):** it is a storage mechanism that retains digital data even if the power is off or is not supplied with electrical power (energy). This is called secondary storage and is used for permanent storage. The secondary storage can further be divided into online and offline data storage. Online storage system or cloud service or online data storage is a term that is used to refer to any file hosting server on the internet.

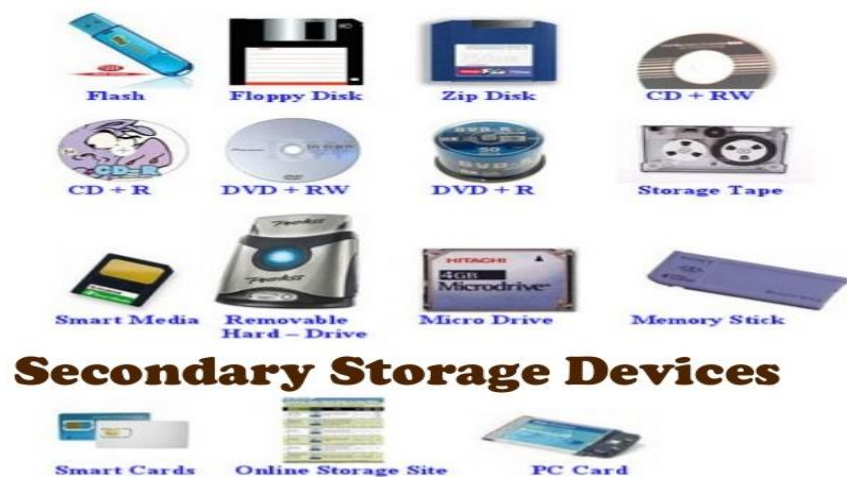


Figure 15 Secondary Storage

Source

http://samihaandniyatidatahandlingtask.weebly.com/uploads/5/1/9/5/51955825/4492101_orig.png

Online data storage: refers to the practice of storing electronic data within a third party server accessed via the internet. Online data storage allows you to store digital media online by uploading via your computer or mobile device through transferring and accessible via the web, the data is actually and physically held on mammoth servers, often owned by whoever provides the particular service you use.

Offline data storage: refers to any storage medium that must be physically inserted into a system every time a user wants to access or edit the data inside it. Offline storage can be any type of internal or external storage that can easily be removed from the computer. Offline storage is also known as removable storage e.g. floppy disks, compact disks and USB sticks facilities.

2.4 Importance of storage in information science

There are lots of advantages of storing a particular thing or transactions, but some of the most commonly known advantages of storage are as follows:

1. Storage helps in keeping a record of all the past activities and transactions.
2. It helps in reducing the burden on the human brain in remembering things.
3. It helps in increasing efficiency and performance.
4. It becomes easy to analyze and compare the records and transactions that took place in the past and on the basis of those records we can also predict future circumstances.
5. Data analysis and forecasting becomes very easy with the use of storage.
6. It provides great flexibility and mobility to the use of the data which is stored in storage as it can be easily moved from one place to another.
7. It also helps in reducing the overall cost that is incurred on carrying out transactions or activity in the day-to-day life.
8. With the use of storage, the scales of operations can be increased easily.
9. It can help in forecasting and also in a better strategy formation.
10. It can also help in knowing the customer needs and demands in an effective manner all the records of their past transactions and activities are available.
11. Management decisions can be improved to many folds as the reason for doing a particular activity or task is provided with the use of analysis and storage.

2.5 Categories of online data storage (cloud)

- Google drive
- Box drive
- One drive
- Amazon drive
- icloud
- Drop box
- **Google Drive:** This is a file storage and synchronization service developed by Google launched on 2012 by Google. Google drive allows users to store files on their servers, synchronize the files across devices and share data or information.
- **Box Drive:** This is a desktop application that provides users with virtual drive with access to all their box content, whether the content is owned or has just been shared. Box drive gives users access to the exact same content as they see through the box web app. Files are not copied to users hand drive, rather they remain on box until opened and edited. Box supports both Windows and Mac operating systems.
- **One drive:** This is a Microsoft storage service for hosting information in the cloud. It is available for free to all the owners of a Microsoft account. One drive offers users a simple way to store, synchronize and share various types of information with other people and devices on the internet.

- **Amazon drive:** Formally known as Amazon cloud drive, is a cloud storage application managed by Amazon. The service offers secure cloud storage, information backup, information sharing and photo printing.
- **icloud:** This is a cloud storage and cloud computing service from Apple INC. launched on October, 2011. icloud enables us to store data such as documents, photos and music on remote servers for download to iOS, macos or window devices, to share and send data to other users and to manage their Apple devices if lost or stolen.
- **Drop Box:** This is a file hosting service operated by the American company Drop Box Inc. headquartered in San Francisco. It assists in file synchronization, personal cloud and client's software.

2.5.1 Advantages and disadvantages of online storage (cloud storage)

Advantages of online storage (cloud storage)

1. **Highly reliable and available:** Most enterprise cloud storage providers store customer's data in 3 or more physical copies to ensure availability and reliability.
2. **Scalable in capacity and performance:** Most enterprise cloud storage providers have different performance tiers for different types of data.
3. Pay-as-you go, billed on actual use.
4. **Geographic scalability:** Most enterprise cloud storage vendors have datacenter locations around the world and customers can easily replicate their data for faster local access and/or even higher availability.
5. **No hardware purchase needed from the customer:** No hardware operations needed. No hardware refresh needed. Challenges related to datacenter space, cooling and power are also addressed by the service provider and not the customer.
6. **Highly secured environment:** Operation, security, privacy, etc are usually compliant to various legal and industry standards. Regular third-party audits. (Difference between service providers can occur, check their respective information).

Disadvantages of cloud storage vs. on-premise storage infrastructure

- 1 Higher latency and lower bandwidth for local data access. (Slower performance).
- 2 Downstream data transfer costs may apply. Running I/O intensive or bandwidth-intensive applications locally against cloud storage can be costly. This can be overcome by re-architecting the application, though.
- 3 High performance cloud storage tiers are usually slower than on-prem high-performance storage. High storage performance criteria cannot be met (or just very costly) with cloud storage.

2.6 Offline storage of information

Offline storage is any storage that is not currently online, live or connected to the computer. Offline storage refers to any storage medium that must be physically inserted into a system every time the user wants to access or edit the data. The data stored in offline storage remains permanently in the storage device even if it is disconnected or unplugged from the computer after the data has been stored. Offline storage is also known as removable storage.

The offline storage is divided into three main categories:

1. **Solid state devices (SSDs):** This is a type of mass storage device similar to a hard disk drive (HDD). Unlike hard drive, solid state devices (SSDs) do not have any moving parts (that is why they are called solid state drive). Instead of sharing data on magnetic platters, solid state devices (SSDs) stores data using flash memory. Examples of solid state drive include; USB drives, hard drives, memory stick, IPOD, digital camera, sim cards and smart cards such as pin credit and debit cards etc.
2. **Magnetic storage devices:** Magnetic storage or magnetic recording is the storage of data on a magnetized medium. Magnetic storage uses different patterns of magnetization in a magnetisable material to store data and is a form of non-volatile memory. Examples of magnetic storage device include; magnetic tapes, floppy disk, hard disk etc.
3. **Optical storage devices:** This is a storage type in which data is written and read with a laser. Typically, data is written to optical media, such as compact disks (CDs) and DVDs. Optical media is more durable than tapes, hard disk drives (HDDs) and flash drives and less vulnerable to environmental conditions. Examples of optical storage device include; CDs, DVDs, blu-ray disks etc.

2.6.1 Advantages and Disadvantages of Offline Storage

Advantages of offline storage

1. Small storage units are cheap;
2. Intellectual property data of business is not in the hands of a third party;
3. Can be connected to other media such as projectors, data centres, and televisions;
4. Solid state hard drives have no moving parts and are designed to last (on average) for 10K writes.

Disadvantages of offline Storage

1. Difficult to share your data
2. Cannot access your data remotely
3. Risk of data loss or corruption

4. Virus and Malware attack are common
5. Expensive to store large data offline
6. Cannot increase or decrease storage space on demand
7. Maintenance cost is high
8. Cannot share data anytime

2.7 Information dissemination in information science

To disseminate means to spread information, knowledge opinions widely. “Semin” is derived from the Latin word for seed. The idea with “disseminate” is that information travels like seeds sown by a farmer. Information dissemination is the transportation of information to the intended recipients while satisfying certain requirements such as delay, retrieving and so forth. These requirements vary, depending upon the information being disseminated. Some information can be disseminated, orally while some need to be documented and distributed in paper form.

Methods of Information Dissemination

1. Publishing programme or policy briefs.
2. Publishing project findings in national journals and statewide publications.
3. Presenting papers at national conferences and meetings of professional associations.
- 3 Presenting programme results to local community groups and other local stakeholders.
- 4 Creating and distributing programme materials, such as flyers, guides, pamphlets and DVDs.
- 5 Creating toolkits of training materials and curricula for other communities.
- 6 Sharing information through social media or on an organisation's website.
- 7 Summarizing findings in progress reports for funders.
- 8 Disseminating information on an organisation's website.
- 9 Discussing project activities on the local radio.
- 10 Publishing information in the local newspaper.
- 11 Issuing a press release.

21st Century Information Dissemination Techniques

Information dissemination dates back to the olden days and with the birth of technology and improvement in ICT, there is also an improvement in information dissemination in information science. Some modern techniques make use of laptops, smartphones and computers. Shonhe (2017) cited Fagbola, Uzoigwe & Ajegbomogun (2011) and outlined some 21st century information dissemination techniques which are as follows;

1. Online Public Access Catalogue

Online Public Access Catalogue is an online catalogue where users can access and retrieve information resources promptly. Online Public Access Catalogue can be accessed with the use of mobile technology such as mobile phones and computers. These devices can be used to access the data bases of different libraries. Most universities have data bases of both their students and staff which can be accessed via online public access catalogue. Some can be accessed by everyone but others require a username and passcode.

2. Short Message Service (SMS) notification

Short message service is when information is disseminated through a telephone set in form of text messages and multimedia content such as videos, images and audio files. Libraries and information centers use this medium to inform their users of outstanding fees, renewals, interlibrary loans and new arrivals. Information can be disseminated quickly with bulk short message service where messages are sent to a large number of people at the same time at a subsidized rate.

3. Social Media Networks

Social media networks are tools that information providers use to disseminate information. A lot of people are always on one social media platform or the other and have become addicted to it so information professionals can capitalize on that and disseminate useful information to groups or individuals. Some social media platforms are; Facebook, twitter, Pinterest and WhatsApp, just to mention a few.

4. Online Reference Services

Online reference services include enquiries that customers may want to know about such as opening hours, closing hours and customer care numbers. When users are aware of this information, there is improved delivery of library resources and services. Relationship between the library and its users is being cultivated and strengthened and efficiency can be greatly improved. Multiple customer queries can be attended to at the same time by the use of modern technology.

5. Library Websites

Every library is encouraged to have a website that serves its users and patrons. Library websites are meant to be user friendly and current information is being posted there for its users. News concerning the library is being announced on the website in addition to other relevant information concerning resources and the library in general. In this unit, you learnt that storage is the process how digital data is safely kept for easy retrieval using computer technology. The two major types of data are; primary storage also known as volatile storage because without electricity it cannot be saved; the second type of storage is secondary data or non- volatile data because with or without electricity,

information can be saved in devices. Secondary data is subdivided into online data storage and offline data storage.

2.8 SUMMARY

This unit has discussed extensively the meaning of storage, its types, importance, the advantages and disadvantages of the types of storage devices. Information dissemination basically means spreading information and knowledge. Methods of information dissemination are; issuing a press release, presenting papers at national conferences, policy briefs, publishing in local newspapers and so on. 21st century information dissemination techniques include online public access catalogue, short message service (SMS), social media networks, online reference services and library websites.

SELF ASSESSMENT EXERCISE

1. What is OPAC?
2. What is solid state devices?

2.9 GLOSSARY

- **Online storage** – refers to the practice of storing electronic data within a third party server accessed via the internet.
- **Offline storage** - Offline storage is any storage that is not currently online, live or connected to the computer. Offline storage refers to any storage medium that must be physically inserted into a system every time the user wants to access or edit the data.

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2.11 POSSIBLE ANSWERS TO SELF ASSESSMENT EXERCISES WITHIN THE CONTEXT

1. Online Public Access - Online Public Access Catalogue is an online catalogue where users can access and retrieve information resources promptly.
2. This is a type of mass storage device similar to a hard disk drive (HDD). Unlike hard drive, solid state devices (SSDs) do not have any moving parts (that is why they are called solid state drive).

UNIT 3: INFORMATION SYSTEMS AND EVALUATION

UNIT STRUCTURE

- 3.1 Introduction**
- 3.2 Learning outcomes**
- 3.3 Definition of information system**
- 3.4 Characteristics of Information System**
- 3.5 Components of Information System**
- 3.6 Evaluating an Information System**
- 3.7 Criteria for evaluating an Information System**
- 3.8 Summary**
- 3.9 Glossary**

3.10 References/Further Readings

3.11 Possible Answers to Self-Assessment Exercises

3.1 INTRODUCTION

Information systems are formal, socio-technical, organisational systems designed to collect, process, store and distribute information. In a socio-technical perspective, information systems are composed of four components: task, people, structure (or roles), and technology. An information system is a work system whose activities are devoted to capturing, transmitting, storing, retrieving, manipulating and displaying information. As such, information systems inter-relate with data systems on the one hand and activity systems on the other. An information system is a form of communication system in which data represent and are processed as a form of social memory.

As data facilitate social relations and knowledge, institutions like museums, libraries, and archives engage in a highly challenging task of mediating and transforming information to enable users' access information and be information literate.

3.2 LEARNING OUTCOMES

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

- Define information system.
- Discuss the components of information system.
- Explain how to measure the effectiveness of an information system.
- Identify the criteria for evaluating information system

3.3 Definition of Information System.

An information system is the combination of hardware, software, infrastructure and trained personnel organized to facilitate planning, control, coordination, and decision making in an organisation. It is an integrated set of components for collecting, storing, and processing data and for providing information, knowledge, and digital products. Organisations rely on information systems to carry out and manage their operations. By the mid-sixties several organisations had deployed information systems for both internal and external communication through telecommunications using the TELEX machine, effectively passing instructions and information anytime and anywhere all over the world.

In the seventies, the TELEX became the standard of information transfer and the mainframe computer became the standard for database creation. The invention of the mini and microcomputers initiated the need for the standardization of all the electronic data interfaces (EDI) within organisations so that information could be transferred more efficiently.

The mid-eighties witnessed the development of the World Wide Web by Berners-Lee using the HTML protocol over the existing internets that opened a new era of electronic

data interfaces all over the world. By the mid-1990's it became apparent that organisations need to setup a solid functioning information system to efficiently do business as well as connect with its supply-chain vendors and distributors. Information Systems development revolves around the users - their needs, performance expectations, requirements and other specifications. The success or failure of an information system is determined by the level of users' satisfaction in the organisation information delivery system.

Advancements in Information and Communication Technologies (ICT) in the 21st century has efficiently enhanced daily operations, management, internal and external communications of organisations. The development of modern information systems is a challenging task. New technologies and tools spring up on a daily basis, users' needs keep changing, and the Information Technology industries struggle to cope with demands for highly efficient and easily adaptable information systems to be competitive and up-to-date.

3.4 Characteristics of Information System

An information system is a system that provides information according to a user's request. The characteristic of an information system depends on what the information system does. There are two characteristics of information system- Passive and Interactive information system.

1) Passive Information Systems

Passive information systems are systems that will answer queries based on the data that is held within them, but the data is not altered. A simple example would be an electronic encyclopedia where queries can be used to search for data and much valuable information can be learned, but the user is not allowed to alter the data. Another example would be the student file in a school that can be accessed by members of the teaching staff to find out where a student is at a time of day, or to look up their telephone number to contact the parents. The database of information is a valuable resource, but it is not possible for an ordinary teacher to alter it.

2) Interactive Information Systems

An interactive system is one that data can be entered for processing which may alter the contents of the database. An example would be the school secretary updating the attendance record of a pupil in the pupil file. In commerce, a stock control system in a supermarket is an interactive information system because it not only gives information like the price and the description of the goods for the till receipt (passive), but also updates the number in stock immediately (interactive) so that when the next item is sold the number in stock has already been altered.

3.5 The components of an information system

There are five major components of information system: People, Hardware, Software, Data, and Networks.

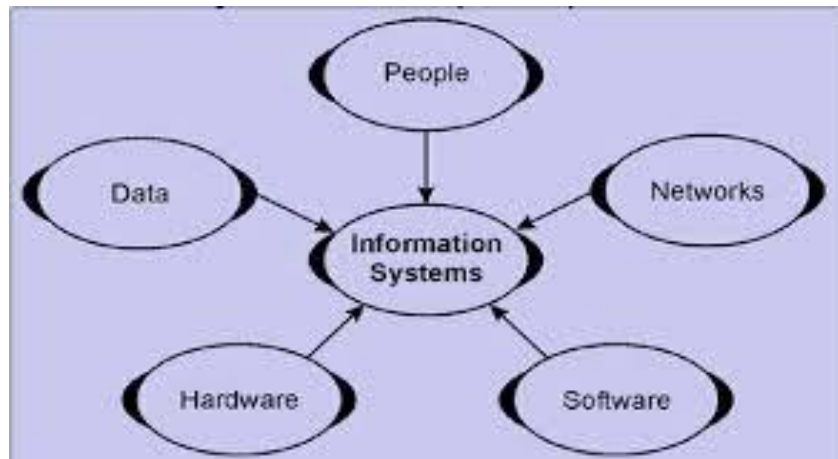


Figure 16 Components of an Information System

Source

https://sites.google.com/site/bus141wikisite/_/rsrc/1416280239711/home/chapter-1-information-system-and-you/what-is-an-information-system/is.png?height=172&width=294

i. People

These are the end-users and information system professionals who either use or develop information system solutions. The end users or clients are the clerks, accountants, librarians, and you. The information system (IS) professionals design, code, or operate these information system solutions. They are the systems analyst, programmer and computer operators. Information systems are designed by systems analysts based on end-users need, programmers write the computer programs based on systems analysts' specifications, while computer operators operate the information system (IS) solutions.

ii. Hardware

Hardware is physical devices used in the processing of information. These include the computer systems such as the super-computers, mini-computers, and micro-computers; computer peripherals such the printers, keyboards, mouse, display units; storage devices like Hard disks, CD/DVDs, Memory cards.

iii. Software

Software are sets of information processing instructions called programs which direct and control the hardware, and the procedures to be followed by people to operate the information system solutions. Examples of software include: operating systems like Linux, Windows; application software like MS Excel, MS Word, and Peachtree. Procedures are information system solutions operating manuals for the people.

iv. Data

In information system (IS), data can be both processed and an unprocessed information as one organisation may require data from another. Hence, the information system output of

an organisation may be the information system input of the other. Data may represent valuable resources of an organisation. Thus, they should be viewed as data resources that must be effectively managed for the benefits of all end-users. Data could be alphanumeric, numeric, alphabetic, business transactions, natural events, entities, written sentences and paragraphs, images, audio and video. Information system data resources are organized into: Database that hold processed and organized data and Knowledge base that hold knowledge in variety of forms such as facts, rules, regulations and business practices and principles.

v. Networks

The interconnection of multiple devices such as computers, telecommunications networks, multi-media, and miniature devices used by organisations' information system solutions. Example of network resources are communication media such as twisted-pair cable, coaxial cable, fiber-optic cable, microwave systems, and communication satellite systems; people, hardware, software, and data resources that are used for communications network operation.

3.6 Evaluating an information system

Evaluation has its origin from a Latin word "Valupure" which means the value of a particular thing, idea or action. Evaluation is a process that critically examines a programme. It involves collecting and analyzing information about a programme's activities, characteristics and outcomes. Its purpose is to make judgments about a programme, to improve its effectiveness, and/or to inform programming decisions (Patton, 1987). Evaluation of information system performances means the evaluation of performances in hardware, software, computer networks, data and human resources. The main objective of information system functionality performances evaluation is upgrading and especially improvement in quality of maintenance. Numerous information system evaluation methodologies are proposed in management studies.

According to Ann in Issa et al (2013), to evaluate is to judge the quality of an idea, an object or a person. Evaluation is defined as the making of judgment about the value, for some purpose, of ideas, works, solutions, methods and materials. It involves the use of criteria as well as standards for appraising the extent to which particulars are accurate, effective, economical or satisfying.

3.7 Criteria for evaluating an information system

Information systems are already part of the academic life for millions of institutions around the world. The easiness of their use, as well as the structure they provide for everyone involved, including students, teachers and parents, is one of the major reasons that information systems have become so popular in recent years.

But what makes an information system a good one? Here are the five criteria that will help you evaluate if an investment in a new information system is actually worth it:

1. The “actual” cost of information system ownership

- When evaluating your information system, you might underestimate how much money cheap software can actually cost you in the long run.
- Future repair costs and residual value, as well as limited functionality and system inflexibility, can cost way more than an initially expensive information system. So, in order to evaluate your platform, you should take into consideration all these variables.
- How much are you spending on updating and maintaining your platform? Or backing up data in a self-hosting environment?
- How much do you spend to back up the platform and your data in order to keep them secure and functioning?
- How much are you losing from unexpected downtime or slow performance? Or even, inefficient workarounds to overcome limited functionality?

2. Ease of use

- Is your software flexible enough to carry out all your needs or is it constrained by a one-size-fits-all solution that lacks the flexibility that you need? An information system should be:
- Easy to access: Make sure that the system doesn't require complex access terms like duplicating efforts or entering the same information into separate systems as well as check the functionality and accessibility of mobile apps.
- Easy to comprehend: is the data hard to understand? Is generating reports a time-consuming and stressful process?
- Easy in terms of reporting: Is the system unable to generate reports with the right data in the format that you need?
- Easy when it comes to communication: does your information system lack certain tools that could definitely simplify your experience?
- Able to support: is your supplier team hard to reach in case of error or bug?

3. Compatible integration

When technology and certain software tools are not compatible with each other, teachers, students and pretty much everyone involved face consequences. In general, consider these things:

- Do students spend more time trying to handle the system than to learn?
- When you integrate with a different system is your data in danger?
- Do you need frequent tech support for problems stemming from access to different systems?

4. Future readiness

- Information systems in the past years were mainly on-premise focusing just on storing data about students. In our days, information systems must be connected

with 3rd party systems, such as Office 365, and should be accessible from anywhere, anytime without compromising data security.

- So, the future of the modern information system lies in the cloud as well as in integrations with various LMS such as Moodle or Bright space.

5. Data security

- Data security is incredibly important for the protection of students' privacy. In order to record if your information system is protected effectively make yourself these questions:
- Do you have the ability to control levels of user access?
- Is your information system “leaking” data through a lack of secure integration with other lesser-controlled systems?
- Is your provider back you up with a security team?

3.8 SUMMARY

Information system is a combination of hardware and software systems that are designed to collect, process, store and distribute information. Characteristics of Information system are; passive information systems and interactive information systems. The criteria for evaluating an information system are; ease of use, the actual cost of information system ownership, compatible integration, future readiness and data security. In conclusion, the choice of an information system can be critical for any organisation. An information system is an investment for the effective management of your organisation and of course, students' future success in a complex and technology-driven world. Therefore, it is very necessary that when an organisation wants to acquire an information system, the above criteria should be considered.

SELF ASSESSMENT EXERCISE

1. Mention five components of an information system.
2. List two characteristic of an information system

3.9 GLOSSARY

- Information system - An information system is the combination of hardware, software, infrastructure and trained personnel organized to facilitate planning, control, coordination, and decision making in an organization.
- Networks – Networks are known as the interconnection of multiple devices such as computers, telecommunications networks, multi-media, and miniature devices used by organisations' information system solutions.
- Hardware - Hardware is known as the physical devices used in the processing of information

3.10 REFERENCES/FURTHER READINGS

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3.11 POSSIBLE ANSWERS TO SELF-ASSESSMENT EXERCISES

1. People, Data, Networks, Hardware and Software.
2. Passive information system and interactive information system

MODULE 4: INFORMATION REPRESENTATION IN LIBRARY SCIENCE.

Unit 1: Organisation and Control in Library Science

Unit 2: Internet and Information Science

Unit 3: Role of Information in Modern Society

Unit 4: Relationship of Information Science with other disciplines

Unit 1: Organisation and control in Library science

UNIT STRUCTURE

- 1.1 Introduction**
- 1.2 Learning outcomes**
- 1.3 Organisation in Library Science**
- 1.4 Purpose of Classification**
- 1.5 Types of Classification**
- 1.6 Cataloguing as a tool for organization in the library**
- 1.7 Importance of Organisation – Classification and Cataloguing**
- 1.8 Types of Cataloguing Codes**
- 1.9 Control in Library Science**
- 1.10 Forms and Types of Bibliography**
- 1.11 Bibliographic Control**
- 1.12 Summary**
- 1.13 Glossary**
- 1.14 References/Further Readings**

1.0 INTRODUCTION

Organisation and control in library science is like simse twins that cannot be separated. In the definition of library, what makes it different from other collections is the organized nature of its collections. There is this systematic arrangement of materials in the library which facilitates easy accessibility and usability. There would be chaos, confusion and difficulty in retrieval of information materials in the library if they were not properly organized. A library is worthless without organisation.

According to Okoro in Uzoigwe (2004), in the absence of organisation, “the user (no matter the level of education) would get lost in any library since it would take days, weeks and even months to find any particular book”. The basis of organisation of library resources involves the processes of cataloguing and classification of the resources of a library. The two words are interwoven and at times are interchangeably used.

Cataloguing and classification are the two different procedures employed in organizing library materials in order to make them accessible to library users. Omekwu in Arua(2015) remarks that cataloguing and classification involves a complete combination of subject analysis, creating different access points or retrieval tools and authority control system. This means that cataloguing and classification go hand In hand for effective location and retrieval of information resources in the library.

Control in library science refers to bibliographical control. It means the adequate listing of records of knowledge in all forms, including published as well as unpublished

documents. There should be an effective access to information about documents in the subject by providing systematic bibliographies e.g. www.lisbdnet.com>English. The term bibliographic control means the mastery over written and published records which is provided by and for the purposes of Bibliography.

1.2 LEARNING OUTCOMES

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

- Discuss the meaning of organisation in library context.
- What is the meaning of library control?
- Discuss the two tools that aid library organisation.

1.3 Organisational tools in Library Science (classification and cataloguing)

Classification is the act of grouping like things together. All the number of a group or class produced by classification shares at least one characteristic which members of the other class do not possess. For example, butterfly, moth, housefly, croakroach and tse-tse fly could be housed under one characteristic which is invertebrates' common features which rats, rabbits and squirrels do not possess. We can use classification to Impose order on choice. Classification actually is the product of several attempts by individuals to classify and introduce order into the arrangement of man's intellectual products, from the brick books of Assyria and Babylonia and the Papyrus of ancient Egypt to the book and microfilms of the present day systems.

Classification of library resources, simply defined, is a systematic arrangement by subject of books and other materials on shelves, catalogue and index entries in a manner which is most useful to those who seek definite piece of information. In other words, classification is the process of categorizing similar items and bringing them together. At the end of the exercise, every member of a group so classified has at least one feature distinguishing it from members of other groups.

The classification can only be possible with the use of classification schemes. The classification scheme is a systematic scheme for the arrangement of books and other materials according to the subject or form. It is also a classification code which is a formulation of principles and rules by which consistency may be maintained by the classifier in assigning books to their appropriate places in a system of classification.

1.4 Purpose of Classification

Edoka in Arua (2015) identified the following purposes for classifying books.

1. Classification of books and other information materials facilitates the grouping and maintenance of library collections in a logical order bringing together the latest subjects in some degree of affinity. The same specific symbol is assigned to all the books in the same subject field.

2. Classification makes easy to identify and locate any information material in the library. It is necessary that a library user have a good knowledge and understanding of the classification scheme in general and the one employed by the library in order to enable him make effective use of the library resources.
3. Classification system provides opportunity for limiting a subject and proceeding from a general to the most specific area of the subject.

1.5 Types of Classification Schemes

The following are the classification schemes used for the organisation of library materials:

1. Melvil Dewey's Decimal classification.
2. Charles Ami Cutter's Expensive classification.
3. Library of Congress classification.
4. Moys classification scheme.
5. J.D. Brown's subject classification.
6. Universal Decimal classification.
7. S.R. Ranganathan's Colon's classification.
8. Henry Evelyn Bliss's Bibliographic classification.

1.6 Cataloguing as a tool for organisation in the library.

Cataloguing can simply be defined as the activity or process geared towards ensuring that a library material is put at the appropriate place for quick retrieval. Ikpaahindi in Ogbo (2013) defined the concept of cataloguing thus;

“Cataloguing is the description of the technical features of a publication and the subject it treats in such a way that it will be easy for library users to retrieve it. It could be a bibliographic description of a book or collection, or other resources of a library indicated on cards or printed in form of a book, the retrieval of which could be author, title or subject or through the combination of the three.”

Cataloguing involves two processes; descriptive and subject cataloguing.

Descriptive cataloguing entails entering bibliographic details of any library material in a book or card catalogue. These details include the name of the author, title, edition (if not the first), imprint, collation (number of volumes, pages, columns, leaves, illustrations, photographs, etc), series, international standard book number (ISBN), etc. The descriptive catalogue is akin to physically describing a man based on his name, origin, height, color, and shape such that any person who sees the man being so described would instantly recognize him.

The Cataloging Process

I. Descriptive Cataloging

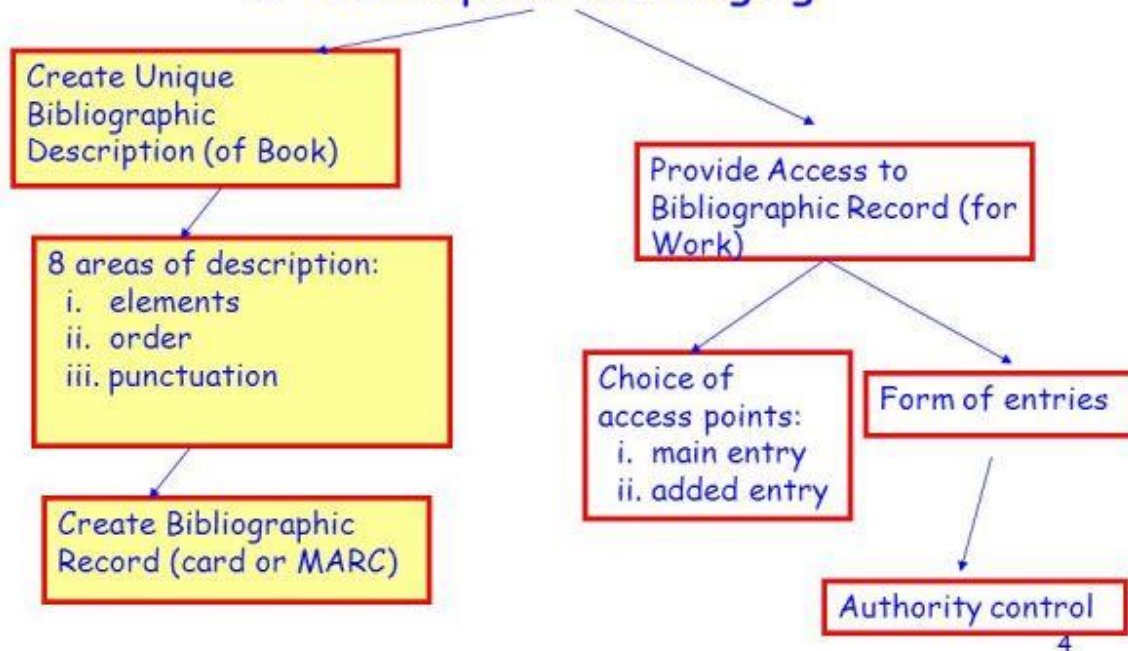


Figure 17 Library operations and services

Source <https://lnulibraryoperations.files.wordpress.com/2016/09/slide.jpg?w=640>

Subject cataloguing involves the choice of access points through the subject to a library material at hand. In doing this, care must be taken to ensure that the most specific subject heading for the material at hand is entered. Sometimes, the title of a book may be deceitful and fail to actually describe the true subject content of the work. It is, therefore, the duty of the cataloguer to read through the book and assign appropriate subject heading to it. So, the job of cataloguing is not an easy one..

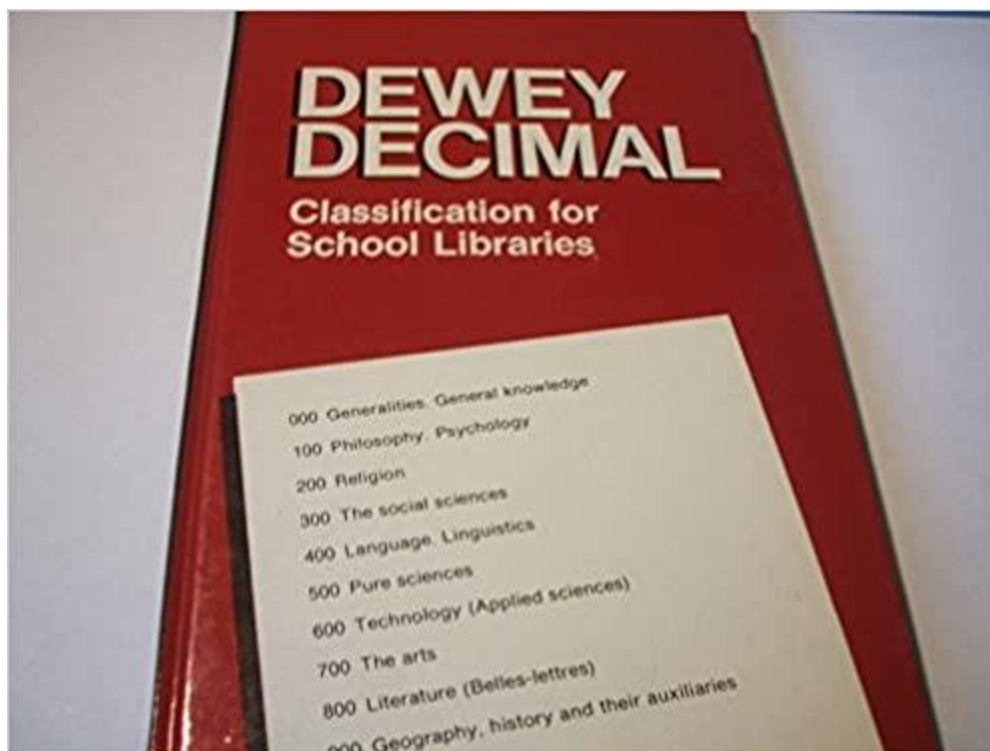


Figure 18 Dewey Decimal Classification for School Libraries.

Source <https://images-na.ssl-images-amazon.com/images/I/51-7BrEL+QL. SY373 BO1,204,203,200 .jpg>

1.7 Importance of Organisation - Classification and Cataloguing

Conventionally, classification guarantees the helpful marshaling of books and documents on the shelves of the library and cataloguing. Charles Ami Cutter sees the importance of cataloguing and classification as follows;

1. To enable a person to find a book of which either:
 - a) The author or
 - b) The title or
 - c) The subject is known
2. To show what the library has
 - a) By a given author
 - b) On a given subject
 - c) In a given kind of literature
3. To assist in the choice of a book.
 - a) As to its edition (bibliographical details)
 - b) As to its character (literal or topical)

The convectional schemes of classification has been unreliable and logically absurd as observed by Trevons and consented by Shara on the basis that classification schemes intend to limit the multidimensional knowledge to an unidimensional order, thereby introducing the linear arrangement on the shelves of the library.

This, per-se, impairs the usage of classification as an efficient way for the arrangement of documents in a library. Thus, we have to rely on the library catalogue which has a better edge on classification, as we can embrace multiple entry systems for a single document and fulfill different and multidimensional modes of the users. Materials should be catalogued and classified into planned fashion to make them ready as soon as possible after receipt. Materials can be catalogued envelop print, non-print and electronic resources, www.lisbednet.com and remote databases to which the library subscribes in the modern era, throughout the globe, following general classification.

1.8 Types of Cataloguing Codes

In the process of cataloguing library materials, cataloguing codes and rules were devised to guide on how to catalogue library materials. Cataloguing rules have been defined to allow for consistent cataloguing of various library materials across several persons or a catalogue team and across time.

This led to the emergency of cataloguing rules, codes and standards to guide the cataloguers.

The following are some of the rules:

1. Anglo American cataloguing standards which were attributed to Anthony Panizzi in early 1800s. His 91 rules published in 1841, formed the basis of cataloguing in the English-speaking libraries and in American.
2. In the 20th century (1908), the Anglo American rules; catalogue rules: emphasized on Author, and title Entries.
3. American library Association Rules; A.L.A Cataloguing Rules for Author and Title Entries (1949).
4. Library of Congress rules; Rules for Descriptive Cataloguing in the Library of Congress. 1949
5. American Anglo Cataloguing Rule (AACR) 1967.
6. AACR2-R: Gorman, Michael, Winkles, Paul Walter, Aacr, Joint Steering Committee for revision of the Association of American library (1988). Anglo-American Cataloguing Rules (2nd revised edition).

Currently, most cataloguing are similar to, or even based on, the international standard Bibliographic Description (ISBD), a set of rules produced by the International Federation of library Association and Institutions (IFLA) to describe a wide range of library materials. These rules organize the bibliographic description of an item in the following eight areas- Title and statement of responsibility (Author or editor), edition, material specific details (for the scale of a map), publication and description, physical description (for e.g., number of pages), series, notes and standard book number(ISBN).

There is an initiative called the bibliographic framework (BIBframe) that is an initiative to evolve bibliographic descriptive standards to a link data model, in order to make bibliographic information more useful within and outside the library community.

Currently, the Library of Congress is preparing BIBframe which when made available to the public will aid cataloguing.

1.9 Control in Library Science

In library science the word control is associated with bibliographic control. What is Bibliography and Bibliographic control?

The word bibliography is a Greek word which means the writing or copying of books. In Greek, the word is separated into two; biblion (meaning book) and graphein (meaning to write). According to Nwosu in Ogbo (2013), “this is a reference material containing an orderly list and descriptions of books and other related materials”. Aman (2007) defined bibliography from two perspectives. It is a list of books or articles about a certain subject or it can mean a list of books that is written by a particular author. Bibliography can be defined in three different ways.

1. A complete or selective list of work compiled upon some common principle, as author, subject, place of publication or publisher.
2. A list of source materials that are used or consulted in the preparation of a work or that are referred to, in the text.
3. A branch of library science dealing with the history, physical description, comparison, and classification of books and other materials.

However, a bibliography is a reference list containing materials that are relevant to a specific field of knowledge. Note must be taken because there is a difference between a list of references and bibliography. Reference is connected with the list of materials cited in the course of writing a report, a bibliography is a list of materials that are relevant to the report, but such materials may not have been cited.

1.10 Forms and Types of Bibliography

Forms of Bibliography

According to Edoka (2013), there are two major categories of bibliography-Analytical or critical bibliography and systematic or enumerative bibliography.

1. Analytical or critical bibliography means the study of books as physical or material objects. It involves subjecting every aspect of the book (printing, paper, binding, illustration and publishing) to purely physical examination scrutiny. (Edoka in Agbo 2013).

Arua (2011) went further to say that analytical bibliography is the detailed description of the volume in hand so that a reader can deduce the characteristics of the work within a short time, with a view to knowing whether or not to search for the original work.

- 2 Systematic or enumerative bibliography, on the other hand, deals with the ideas on knowledge contents of the books. According to Edoka (2000) it is a systematic listing of recorded knowledge comprehensive within its limit and arranged in a logical order.

Commonly recognized systematic or enumerative bibliography includes;

- ✓ Universal Bibliography (including printing catalogue of great national libraries e.g. bibliotheca universalis).
- ✓ National Bibliography (e.g. Indian National bibliography, Nigeria National Bibliography).
- ✓ Trade Bibliography (e.g. cumulative book index, Indian Book in print).
- ✓ Bibliography of anonymous and pseudonymous work (Dictionary of anonymous and pseudonymous literature).
- ✓ Selective or Elective bibliography (e.g. world's best book).
- ✓ List of periodicals (Wrich's internationals directory periodicals).
- ✓ List of theses, dissertation (e.g. Indian dissertation abstract).
- ✓ Author Bibliography (e.g. Chaucer, a bibliography manual).
- ✓ Subject Bibliography (e.g. Library Literature).
- ✓ Bibliography of Bibliographies (e.g. Bibliographic index).

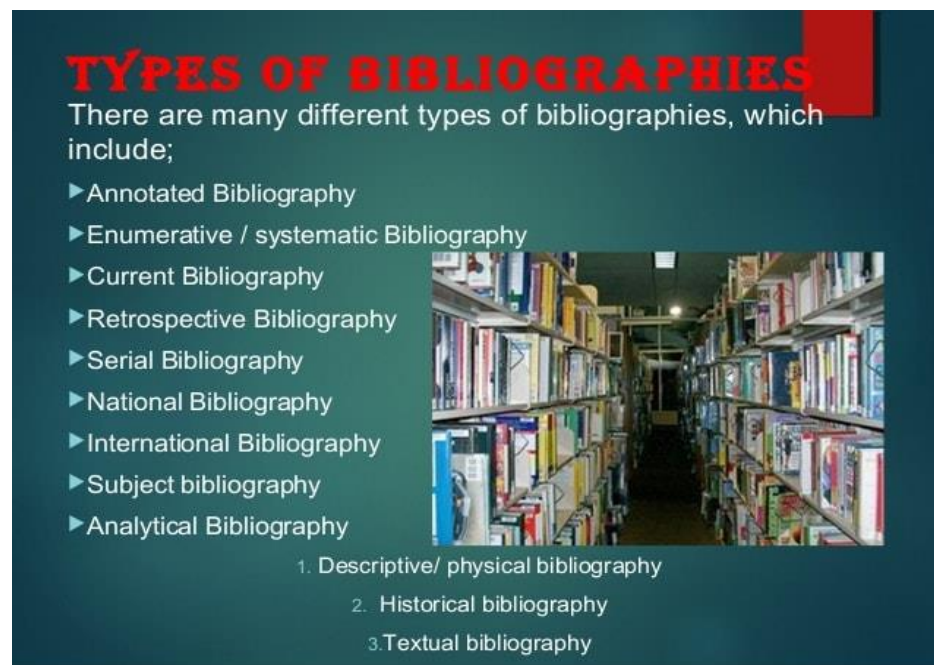


Figure 19 **Types of Bibliographies**

Source <https://image.slidesharecdn.com/group3bibliography-171117173244/95/bibliography-4-638.jpg?cb=1510940377>

Other types of bibliography include;

- National Bibliography

- Subject Bibliography
 - Trade Bibliography
 - Reviewing Bibliography
 - Special Bibliography
 - Bibliography of Bibliographies
 - Printed Library Catalogue.
- National Bibliographies are non-commercial publications that attempt to list everything produced in a country “under the auspices of a national or other governmental agency”. The items usually come to the agency through a national copyright law that demands legal deposit. Examples are the National Bibliography of Nigeria (NBN) and the British National Bibliography (BNB) .The NBN classifies and catalogues books and other materials deposited at the National Library of Nigeria, and the BNB does the same for all British books deposited at the British Museum.
 - Subject Bibliographies are lists of materials that relate to a particular discipline or subject scope. The aim is to appropriately guide a researcher working on a given subject area instead of doing a haphazard search for literature. Examples include Bibliographic guide to Technology, current Mathematic Publications. A Bibliography of Librarianship and International Catalogue of scientific Literature.
 - Trade Bibliography- Trade Bibliography sometimes called a catalogue, lists books and other materials that are issued by a particular publisher or group of publishers mainly for the book trade. Examples are: Books in print, Publisher’s trade journal, Bookseller (UK) and cumulative Book Index (USA).
 - Bibliography of Bibliographies; a bibliography of bibliographies lists bibliographies which direct readers to useful bibliographies through subject, name of the individual place, institution, etc. The bibliographies referred to may be in a form of a separately published book or part of a periodical article or some other type of document. As the number of bibliographies is published every year is large, therefore, bibliography of bibliographies are highly selective in nature. Example;

Bibliographic index, cumulative bibliography of bibliographies, 1937, New York, Wilson 1938, Index Bibliographicus, 4th edition, The huge, Federation, Internationale de Documentation, 1959 to date.
 - Special Bibliography. According to Edoka (2000) is a type of bibliography that deals with special types of materials example, films, maps, recording, etc. This type also includes index to translations and dissertation, for example, UNESCO index of Translation, Bibliography of films, maps, recordings, etc.
 - Printed Library Catalogue; it is a book catalogue entries for books in the collection of a library printed and bound in book form. One page of the catalogue contains more than one entry. Catalogue of many libraries are available in book form. It is easily transportable and can be used outside the library when needed. Example, National Union Catalogue, British Museum Catalogue.
 - Reviewing Agencies; reviewing agencies acts as bibliography as they assist the libraries in selecting new books and other library materials. They give critical assessment of

books they list, containing information on new books currently in the market as well as forthcoming books. For proper guidance, a reader or a library should consult book reviews and guides to book reviews to help him/her to select current materials.

1. Bibliographic Control

The word control ordinarily is the act or power of controlling, regulation, domination or command. In the library, when talking of control, it means bibliographic control, trying to control what is published using appropriate tools to record them for easy retrieval by users.

According to Ronald Hagler, bibliographic control is the identification, description, analysis and classification of books and other materials of communication so that they may be effectively organized, stored, retrieved and used when needed. The following are the six functions of bibliographic control by Ronald Hagler.

1. Identifying the existence of all types of information resources as they are made available. The existence and identity of an information resource must be known before it can be found.
2. Systematically pulling together these information resources into collections in libraries, archives, museums and internet communication file and other such depositories. Essentially, libraries are acquiring these items into collections so that they can be of use to the user.
3. Producing lists of these information resources prepared according to standard rules for citation. Examples of such retrieval aids include library catalogue, indexes, abstract, archival finding aids etc.
4. Providing name, title, subject and other useful access to these information resources. There should be many ways to find an item and so there should be multiple access points.
5. There must be enough materials in the surrogate record so that users can successfully find the information they are looking for. These access points should be consistent, which can be achieved through authority control.
6. Providing the means of locating each information resource or a copy of it. In libraries, the online public access catalogue (OPAC) can give the user location information (a call number for example) and indicate whether the item is available.

In the process of cataloguing library materials, cataloguing codes and rules were devised to guide on how to catalogue library materials. For example, AACR2. You also learnt that there are two major categories of bibliography-Analytical or critical bibliography and systematic or enumerative bibliography. In addition, other bibliography are National Bibliography, Subject Bibliography, Trade Bibliography, Reviewing Bibliography, Special Bibliography, Bibliography of Bibliographies and Printed Library Catalogue.

1.12 SUMMARY

This unit has discussed organisation and control in library science, the tools that aid the organisation of library materials. Also discussed were the types of bibliographies and bibliographic control tools in the libraries that aid a researcher to retrieve materials from the library easily. The unit also differentiated between cataloguing and classification. You have learnt in this study unit that classification is the act of grouping like things together and can only be possible through the use of class themes. Classification is subdivided into eight categories namely:

1. Melvil Dewey's Decimal classification.
2. Charles Ami Cutter's Expensive classification.
3. Library of Congress classification.
4. Moy's classification scheme.
5. J.D. Brown's subject classification.
6. Universal Decimal classification.
7. S.R. Ranganathan's Colon's classification.
8. Henry Evelyn Bliss's Bibliographic classification.

SELF ASSESSMENT EXERCISE

1. Define cataloguing
2. Define classification

1.13 GLOSSARY

- **Bibliographic control** - Bibliographic control is the identification, description, analysis and classification of books and other materials of communication so that they may be effectively organized, stored, retrieved and used when needed.
- **Classification** - is a systematic arrangement by subject of books and other materials on shelves, catalogue and index entries in a manner which is most useful to those who seek definite piece of information
- **Cataloguing** - Cataloguing can simply be defined as the activity or process geared towards ensuring that a library material is put at the appropriate place for quick retrieval.

1.14 REFERENCES/FURTHER READINGS

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1.15 POSSIBLE ANSWERS TO SELF ASSESSMENT EXERCISES WITHIN THE CONTEXT

1. Cataloguing is the description of the technical features of a publication and the subject it treats in such a way that it will be easy for library users to retrieve it. It could be a bibliographic description of a book or collection, or other resources of a library indicated on cards or printed in form of a book, the retrieval of which could be author, title or subject or through the combination of the three.
2. Classification of library resources, simply defined, is a systematic arrangement by subject of books and other materials on shelves, catalogue and index entries in a manner which is most useful to those who seek definite piece of information.

UNIT 2: INTERNET AND INFORMATION SCIENCE

UNIT STRUCTURE

- 2.1 Introduction**
- 2.2 Learning outcomes**
- 2.3 Internet and information science**
- 2.4 Impact of Internet on Library and Information Services**
- 2.5 Different Tools and Services of Internet**
- 2.6 Resources Available on the Internet**
- 2.7 Summary**
- 2.8 Glossary**
- 2.9 References/Further Readings**
- 2.10 Possible Answers to Self-Assessment Exercises**

2.1 INTRODUCTION

The advent of the internet into the world has revolutionized and affected all the ways of doing everything. The internet has continued to have considerable impact on our lives. This is evident from the way people have accepted it and are using it to accomplish many things in so little time. Internet is so significant to our lives to the extent that virtually everything we do now is online. It is as a result of this that we have these concepts today- E-commerce, E-banking, E-book, E-journal, E-magazine etc. The internet as a matter of fact provides the largest reservoir of vital information to individuals, business people, group researchers, information science (library) and other disciplines all over the world. The Internet has metamorphosed into a world wide web (www) which is essentially a networking arrangement with global access.

2.2 LEARNING OUTCOMES

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

- Define internet.
- State the impacts of internet on information science.

2.3 Internet and Information Science

The internet is a tool that connects millions of computers together, allowing them to communicate with each other. Information is not “stored” on the internet. Rather information is stored on host computers, the internet is simply a tool that allows you to access information stored on someone else’s computer.

The internet is a global system of interconnected computer networks that we use the standard internet protocol suite (TCP/IP) to link several billion devices worldwide. It is an international *network of networks* that consists of millions of private, public, academic, business, and government packet switched networks, linked by broad array of electronic, wireless, and optical networking technologies.

2.4 Impact of Internet on Library and Information Services

It is an established fact that no other recent innovation has impacted the library profession to such a great extent as the internet. The internet is fully making our world to become an interconnected global community, but this early use of the Internet has changed the fundamental roles, paradigms, and organisational Culture of libraries and librarians as well, which created profound impact on libraries and information science (LIS) by offering new modes of information delivery and a vast information source. There is a continuing evolution of the roles and functions of libraries and librarians, which appears to parallel the growth of acceptance and use of the Internet by library professionals. The innovative use of Internet technologies enables us to reach both local and distant users much more easily and effectively than hither to possible.

Technologies such as e-mail and the Web provide tremendous opportunities for library and Information Scientists to deliver the information to the desktops of our users. The web offers Significant advantage by integrating different library and information services with a common user interface offered by Web browsers. Realizing the potentials, many libraries are rushing to getting the connectivity. The following listing will give an idea of which various functions of libraries may take advantage from Internet and Web technologies:

Acquisition:

- Correspondence with Book seller & Publisher.
- Reminders, Price verification
- Bibliographic details and downloading of bibliographic records, etc
- Ordering, billing
- Bookshops are on-line e.g. amazon.com

Classification:

- Network resources (in place of conventional sources)
- Available on the net
- subscribed or free or trial basis
- Dewey Online
- Maths. Classification System
- Engineering Electronics Lib. Classification
- Search engines – such as yahoo use DDC.

Collection Development:

- Ownership vs. Access
- Subscribe in print or e-form

- Subscribe in print as well as in e-form
- Pay-per-use
- Consortial approach

Cataloguing:

- Cataloguing of network resources
- Online Catalogues
- WorldCat (OCLC)
- WebOPAC – web sites
- MARC adds 856 field
- OCLC Scorpion project- MARC & AACR2
- Metadata standards- Dublin core

Circulation:

- Remote login
- Status check
- OPAC access
- Reminder to users
- User requests
- Direct borrowing
- ILL (inter library loan)

Resource Sharing:

- Union Catalogue
- Access, adding, downloading
- Access to databases over networks
- Ohionet, ILLINET, WLN, OCLC, BID(UK)
- Full text journals access etc.

Services:

- ILL (inter library loan)
- Document Delivery Service e.g. Ariel
- Reference / Inf. Services
- Recent additions,
- Contents pages
- Information alert services (CAS /SDI)
- From library collection (Lib. Catalogues)
- Databases
- Internet Sources
- OPAC
- Database access
- Bibliographical
- Full text
- Many vendors & organisations are moving to Internet (web) access

Subject Lists/ Gateways :(*With their own Search engines*)

- Internet Public Library
- EEVL – Engineering
- SOSIG – Social Science
- OMNI- Medical
- ADAM – Arts, Design etc.

User Education:

- Through Email
- Through Web
- Setting Intranet

Preservation & Storage:

The Internet is also a medium for the preservation and storage of information. In the past, libraries were seen as the main storage facility of information. As society becomes increasingly more digital and more information resides on the Internet, the focus on storage and preservation is shifting. For example, some academic libraries are now faced with the problem of whether or not to purchase serials that can just be easily accessed online. Preservation of these same media also becomes an issue of economics, with the mentality of “just in case” preservation ideology of the past paradigm. Also joined to the function of preservation is the destruction of information. Because the Internet can be seen as a medium for preserving information, the process of destruction of information also is affected.

2.5 Different Tools and Services of Internet

The different tools and services of internet are as follows:-

E-mail - Exchange of mails

- Text, Graphics, Programmes, Audio, Video etc.
- One-One, One-many, many-many.
- Usenet, listserv, mail base etc.

Telnet - (Remote login)

- Connect to remote machine & login and use the facilities.

File Transfer Protocol (FTP)

- To move files between computers.

World Wide Web (WWW)

- Navigational tool that enables browsing information linked to other related information.
- Hyperlinks/ Hyper text/ Hypermedia based.
- Provides unlimited access to large universe of e-documents

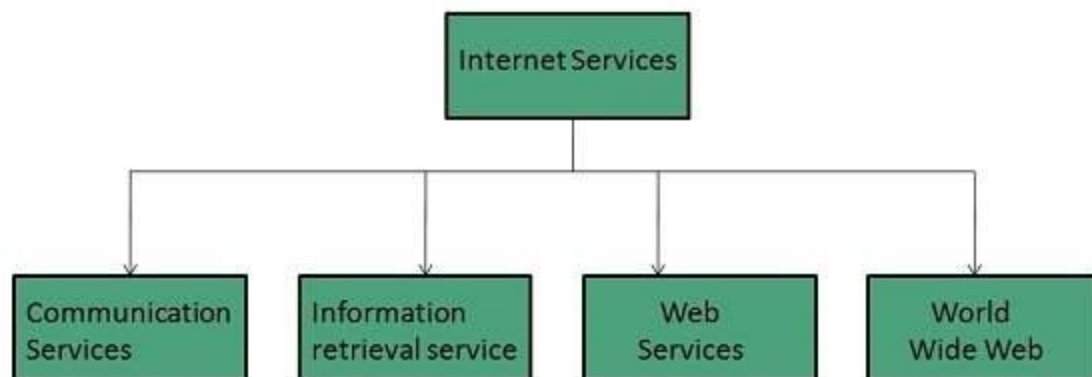


Figure 20 Internet Services

Source https://www.tutorialspoint.com/internet_technologies/images/internet-internet_services.jpg

Other tools include:

Gopher, WAIS, Archie, Veronica, Usenet, bulletin Board Services etc.

2.6 Resources Available on the Internet

The advancement of Information & communication technologies, has made all the information sources and services available in an easy manner. Internet is changing the way we view information sources. Information bundled in World Wide Web in the form of structured and non-structured sources create huge problem for professionals who are dealing with information. In this, library professionals play a vital role in solving the problem. They organize the information and bridge the *information gap*. Internet has become an important part for library environment today. So, the resources may include:-

- E-journals
- E-books
- Standards
- E-TDs(Theses and Dissertations)
- Preprints
- Library catalogue
- Bibliographical Tools
- Share wares
- Old books
- News papers
- Dictionaries
- Magazines
- Encyclopedias
- Databases
- Directories
- Films
- Maps

- Technical reports
- Audio/Video Proceedings
- Patents
- Websites of Companies, Institutions, Organisations, Associations etc.

2.7 SUMMARY

The internet came with technology boom and virtually everything in life was affected. Almost all activities now can be done online which was not so before. The internet is a global system of interconnected computer networks that links several other devices worldwide. The impact of internet in the library affected areas such as; acquisition, classification, collection development, cataloguing, circulation, resource sharing, services, user education and preservation & storage. The internet connects billions of computers in different locations. Different libraries are connected via the internet and they can share resources and do a whole lot of things together. For library and information science, the internet has the following resources; patents, technical reports, magazines, journals, dictionaries, library catalogue, old books, websites of companies and so on.

SELF ASSESSMENT EXERCISE

1. What do you understand by the word “internet”?
2. List five E-resources that may be found on the internet.

2.8 GLOSSARY

- **Impact of the internet** - The impact of internet in the library affected areas such as; acquisition, classification, collection development, cataloguing, circulation, resource sharing, services, user education and preservation & storage.

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2.10 POSSIBLE ANSWERS TO SELF ASSESSMENT EXERCISES

1. The internet is a global system of interconnected computer networks that we use the standard internet protocol suite (TCP/IP) to link several billion devices worldwide.
2. E-journals , E-books , Standards , E-TDs(Theses and Dissertations) , Preprints

Unit 3: THE ROLE OF INFORMATION IN MODERN SOCIETY

UNIT STRUCTURE

- 3.1 Introduction**
- 3.2 Learning outcomes**
- 3.3 Concept and Definition of Information**
- 3.4 Characteristics of Information**
- 3.5 Kinds of Information**
- 3.6 The Role of Information in Modern Society**
- 3.7 Summary**
- 3.8 Glossary**
- 3.9 References/Further Readings**
- 3.10 Possible Answers to Self – Assessment Exercises**

3.1 INTRODUCTION

Man is a decision maker and information is the basis for decision making. Information is power and those that have enough of it possess unlimited power. It is knowledge put to use. Information acts as the life blood in the development of the society. Therefore, information plays a vital role in an individual, organisation, business enterprise or in any society.

According to Aina in Mabawkonku (2017) the term information can be viewed from many perspectives depending on the discipline: For instance, an engineer identifies it with the transmission over communication line, philosophers associate it with recorded facts, with the content of the text or with the experience stored on the human mind, to the common man, it consists of stories and news he hears every time and every day from his wife, his children, other relatives, friends and neighbors etc.

According to Nzotta in Aboyade, Modupe (2016) human beings and human society depend on information for existence, like the dependence on any national resources like man power (labour), capital (money) and energy (including petroleum). Today, information is therefore considered very essential to economic development and for the improvement of quality of life in our society. Information significantly enhances national

development especially in the areas of agriculture, education, health, security, conflict resolution, administrative effectiveness, planning and every area of human endeavor.

3.2 LEARNING OUTCOMES

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

- Define information.
- Explain the characteristics of information.
- Explain the role of information in modern society.

3.3 Concept and Definition of Information

The word information generally means a message, a signal or a stimulus. In the generic sense, information may be defined as that which can be communicated, distributed or received through any medium of communication. Various authors have defined information in different ways:

Information can be seen as facts, news, statistics, reports, legislation, text code, judicial decision, resolutions and the like.

Information can also be described as data which is transmitted between individuals and each individual can make whatever use he can of it. Another way to look at information is to describe it as the knowledge that is put to use, which may produce good or bad results.

Information can be conceived as anything that adds to our existing knowledge, ideas, skills and experiences positively or negatively, that enables us to take decisions or react to situations immediately or later at an appropriate period of time. It can also be conceived as the by-product of our conscious and unconscious actions and inaction that adds to our existing knowledge, ideas, skills and experiences that enable us respond to a given stimuli instantaneously or at a later period of time as a form of reaction or decision taken or to be taken.

3.4 Characteristics of Information

Information is a basic resource for the development of individuals, organisation, industry, community and the nation at large. According to Galhotra (2008), he enumerated the following important characteristics of information as:

1. Information is a human product.
2. Information is the raw material from which knowledge is derived.
3. Information is the finished product of data.
4. Information is used as an aid in decision making.
5. Information is infinity and ever growing.
6. Information is interdisciplinary.
7. Information is used but it cannot be consumed.
8. Information is inexhaustible as its value does not decrease after its use.
9. Information is cumulative.
10. Information increases the level of knowledge of the recipient.
11. Information helps in establishing a continuity from past to present and to future.

12. Information is turbulently dynamic and multidimensional.
13. Information is interactive between human resources.
14. Information is self renewing.
15. Information can be extracted and summarized.
16. Information can be evaluated.
17. Information can be descriptive.
18. Information is self-explanatory.
19. Information should be brief and to the point.
20. Information is exchanged with the outer worlds not merely received.
21. Utility of information changes with time but in a fixed pattern.
22. Information can be recorded and translated.
23. Information is the result of observation and surveys.
24. Information helps in arriving at the right answers.
25. Time factor is very important in information dissemination. Once it becomes outdated, it becomes useless.

Characteristics of Information	
Accurate	Must not contain any errors
Accessible	Access by authorized users
Complete	Must contain all important, related data
Economical	Both in terms of time and cost
Formatted	Should be available in desired format
Flexible	To be used for different purposes
Reliable	Dependable, generated using correct data
Relevant	Relevant, can be used by organization
Secure	Access allowed to authorized individuals only
Simple	Easily understandable, usable
Timely	Available when needed
Verifiable	Means to cross check

We all need information to make decisions and take actions, when needed.

Figure 21 Characteristics of valuable information

Source

<https://slideplayer.com/slide/13813072/85/images/4/Characteristics+of+Information.jpg>

In the views of Ligomenides, one of the inherent characteristics of information is that it is alive, it exists only in the human mind and as such, it is both the input and output of human perception.

3.5 Kinds of Information

There are different kinds of information depending on the various needs of the individual or organisation that wants the information. Basically, there are three kinds of information needs.

These includes scientific, technological and development information.

1. Scientific Information: this type of information arises or comes as a result of research activities, usually in the natural and social sciences.
2. Technological Information: this type of information pertains to technology (i.e. engineering, managerial) and other knowledge that is necessary for the production of goods and services needed by the society.
3. Development Information: this type of information is neither scientific nor technological but is generated for operational purposes. This includes economic, social and cultural information used for population and commercial statistics.

J.H. Shera, further divided information into six kinds according to the type needed in operational research.

- Conceptual information: This is the information that includes ideas, theories, and hypotheses, about the relationship which exists among the variables in the area of the problem of study.
- Empirical information: This includes the data collected through personal experience during research in a laboratory or during literary invention which aid the researcher in carrying out his research findings. This information has scientific foundation.
- Procedural information: This is all about the procedure through which a researcher can perform his work more effectively. Procedural information relates to the means by which the data of investigation are collected, manipulated and examined. This type of information is systematic, methodological and is based on scientific attitude.
- Stimulatory information: This is the information which creates stimulation among the people e.g. victory day celebration.
- Policy information: This type of information focuses on provision of information that aid in decision making process. The decision process includes aims, Learning outcomes and how responsibilities and works are distributed. E.g. law and justice.
- Directive information: This type of information helps in co-ordination. Group activity cannot proceed effectively as it is through directive information that this co-ordination is achieved. E.g. mode of operation in any organisation.

The kinds and types of information is inexhaustible as information is generated everyday for the purpose for which such information is generated. The availability of information when it is needed, improves the ability of an individual, a business, a government agency

and various other kinds of organisations, to make informed decisions, to conduct research e.t.c. and thus achieve the overall sustainable development of a nation.

3.6 The Role of Information in Modern Society

The importance of information in the development and sustainability of a modern society cannot be overemphasized. According to Oladapo (2006) information is an economic resource and critical to the development of both the individual and the society. It is on this note that Njoku in Ogbo (2017) stated that information is key to today's world and anyone who wants to succeed cannot afford to be ignorant of it.

Information can create a modern society through:

“Access to information→Knowledge→and Capacity→Innovation→Productivity→Growth→Employment→Poverty Reduction” (United Nations Economic Commission for Africa, 2007).

Furthermore, the African Union and the United Nations Economic Commission for Africa (2005) advocated that Africa should improve their economy through:

- Use of information to accelerate development, induce good governance and further stability.
- Provide wellbeing and increase, reduce poverty and empower underprivileged groups.
- Enhance the natural capital and human capacity of the region and minimize internal inequalities and
- Further benefit from information by fully becoming part of the global information society.

In a modern society, information significantly enhances national development especially in the areas of agriculture, education, governance, health, security, conflict resolution, administrative effectiveness, planning and so many others.

- Information is an aid in decision making, policy information needed for policy makers, decision makers, managers etc.
- Information has a transforming effect on human beings on receiving it. On receiving information, it brings a great change in the minds and attitudes of the recipient because it increases the person's knowledge.
- Information generates new information.
- Information is important for economic emancipation of any nation.
- When a nation has information literate people, it will achieve better life in the society. The people would be able to take a better political, social and economic decision.

In the views of Ogbo, Uzoagba and Nwebiem (2017) all people, whether they are from rural, urban, industrialized or developing communities require some level of information to make decisions about various aspects of their daily lives.

- A nation with information literate people will have access to reproductive health information which will reduce child mortality, improve maternal health, combat

HIV/Aids, malaria and other diseases and this will ensure environmental sustainability and development.

- With the provision of adequate information in a society, this will lead to effective citizenship.

According to Correia (2017) citizenship can be described as participation in a community, particularly the relationship between the individual and the state. According to her, citizenship is about making informed choices and decisions, taking action either individually or collectively, playing a full part as active citizens, demonstrating moral responsibility, involving in community development and exercising of their rights and responsibilities.

- Information helps in the survival of democratic institutions through the legislature that would make high quality laws, the executive would initiate and execute high quality programmes and policies, while the judiciary would deliver high profile judgments. The overall effect is sufficient, sustainable and enduring democracy which is a panacea for a modern society.
- With the provision of relevant information on agricultural improvement to all agricultural officers, the extension workers, researchers, peasant farmers, policy makers, on the new methods of improving livestock and better farming practice that will increase the satisfaction of the needs of the increasing population. This will enhance bumper harvest and improve the declining food security of the country.
- Academic achievement is possible with the provision of right information and knowledge which is central in the pursuit of life-long learning and enhances one's academic achievement and performance.
- Information plays a great role in the education sector. It is an irrefutable fact that without information provided by libraries there can be no universities, hence the creation of professionals' drought. All professionals are capable in their different professions through knowledge acquired through information provision of contributing meaningfully to the growth of a modern society

In fact, scientists and scholars use information to produce another document, like research reports, thesis, dissertations, books, journal articles, seminar paper etc. Hence information can be applied in some activities to achieve other purposes as follows:

1. The users of various professions and vocations like doctors, engineers, scientists, scholars etc. acquire and apply information in order to do their job more effectively and efficiently. i.e., application of information for practical purposes.
2. Information supports research in order to obtain effective and fruitful results.
3. Information helps in better management of manpower, materials, production, finance, marketing etc.
4. State-of-art kind of information of a subject helps in identifying the gaps/ shortcomings in the subject field and to identify the research problems to be explored or undertaken.

5. Information helps in avoiding the duplication of research.
6. Information stimulates the thought process of the users, particularly the scholars.
7. Information helps the scientists, engineers, scholars, etc. to be well informed of the current advancements in their subjects and to keep them up-to-date

The provision of information of any kind which leads to the development of a modern society is the sole responsibility of the libraries and the library professionals. Therefore, for any society to develop in all spheres of human endeavor their library institutions must be well equipped in order to achieve its assigned roles of providing relevant and timely information needed for sustainable and modern society.

3.7 SUMMARY

The role of information in modern society cannot be over emphasized because humans make use of information on a daily basis for one thing or the other. In simple terms, information means data that has been processed. Some general characteristics of information are; it is a human product, it is interdisciplinary, it is ever growing and so on. there are some basic characteristics of that valuable information must satisfy which are; flexible, accurate, secure, simple, reliable, economical, complete, accessible and accurate. Information is of various kinds namely; scientific information, technological information, development information, conceptual information, empirical information, procedural information, policy information and directive information. The role of information in today's society is pertinent because it is used in decision making, it is used in changing the minds of people, it generally improves the life of people. When a society is informed, the lives of the people there are better off.

SELF ASSESSMENT EXERCISE

1. Name five characteristics of information?
2. Mention three kinds of information

3.8 GLOSSARY

- Information - Information can also be described as data which is transmitted between individuals and each individual can make whatever use he can of it.
- Conceptual Information - Conceptual information: This is the information that includes ideas, theories, and hypotheses, about the relationship which exists among the variables in the area of the problem of study.

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3.10 POSSIBLE ANSWERS TO SELF-ASSESSMENT EXERCISES

1. Information is a human product, Information is the raw material from which knowledge is derived, Information is the finished product of data, Information is used as an aid in decision making, Information is infinity and ever growing.
2. Scientific information, Technological information and Developmental information.

Unit 4: RELATIONSHIP OF INFORMATION SCIENCE WITH OTHER DISCIPLINES

UNIT STRUCTURE

- 4.1 Introduction**
- 4.2 Learning outcomes**
- 4.3 Definition of Information Science as a Discipline**
- 4.4 The Relationship of Information Science with other Disciplines**
- 4.5 Summary**
- 4.6 Glossary**
- 4.7 References/Further Readings**
- 4.8 Possible answers to Self-Assessment Exercises**

4.1 INTRODUCTION

Information science is an important and valuable interdisciplinary and multidisciplinary discipline responsible for several information activities, such as information collection, selection, organisation, processing, management, dissemination and broadly information processing and management.

However, for information science to perform such works, it takes the help of several tools and technologies from other disciplines like communication technologies, database technologies, computing, humanities, management science and so on which play

important roles and enhances footprints of information science. Information science (IS) tries to act as an inter mediator between people, users and communities on their information technological problems and solutions.

Today, information science (IS) is interdisciplinary because it is integrating knowledge and methods from different disciplines to solve information problems using real synthesis or approaches.

It is also multidisciplinary because it draws from other disciplinary knowledge for a specific purpose. For example, sociologists “borrowed” the tools of ethnography from anthropologists in order to develop knowledge and understanding about the behavior of “tribes” within main stream societies.

Some researchers have proved that there exist significant relationship between information science and other disciplines, as information science draws knowledge and ideas that it uses in solving informational problems of all human endeavors from those disciplines.

4.2 LEARNING OUTCOMES

At the end of this unit, you should be able to:

1. Define information as a discipline.
2. Explain the relationship of information science with other disciplines.

4.3 Definition of Information Science as a Discipline

Information science (also known as information studies) is an academic field of study primarily concerned with the analysis, collection, classification, manipulation, storage, retrieval, movement, dissemination, utilization, interpretation and protection of information.

Information science is that discipline that investigates the properties and behavior of information, the forces governing the flow of information and the means of processing information for optimum accessibility and usability.

The Online Dictionary for Library and Information Science, defined information science as “the systematic study and analysis of sources, development, collection, organisation, dissemination, evaluation, use and management of information in all its forms including the channels (formal and informal) and technology used in its communication.

Since our society thrives in information, information science has grown in significance. In addition, most businesses will no longer depend solely on instinctiveness to make business decisions. Currently, businesses depend on big data and decision support in order to support their decisions.

Also, government policy makers need justification for their legislation and information science provides data and information that can aid such decisions. Information stimulates the process of the users particularly scholars. Information helps the scientists, engineers,

scholars e.t.c to get well informed with the current advancements in their subjects and to keep them up-to-date.

4.4.1 The Relationship of Information Science with other Disciplines

In the following paragraphs an attempt has been made to discuss the contribution of some other subjects towards library and information science. The discussion has been arranged according to the alphabetical order of the name of the disciplines.

1. Chemistry: Chemistry is the science of matter. It deals with the composition of substances and their properties and reactions upon one another. Chemistry helps the Library and Information Science in the preservation and conservation of different types of documents. It is extensively used to save the print and / or digital counterparts from different biological agents.

2. Computer Science: Computer science is the study of computation. It is the discipline that is concerned with the methods and techniques related to data processing performed by automatic means. It deals with theories of understanding computing systems and methods; designing methodology, algorithms and tools; dealing with the methods for the testing of concepts, methods of analysis and verification; and knowledge representation and implementation.

Library and Information Science often needs to handle very large quantity of data which always demands the use of computer. In recent times, the work of every branch of Library and Information Science relies directly or indirectly on the use of computer i.e. It is used for library administration, acquisition, retrospective searching, current awareness, SDI services, online database searching, machine translation, etc. It helps to reduce the burden of handling the ever-increasing amount of information. It helps to automate the whole house keeping operation and so on. The computer science with operation research or cybernetics helps in the study and development of information processing, psychology and the behavioral sciences, through putting light on the human processes involved in knowledge-transfer such as communication process, analysis of user needs and man – machine interaction.

3. Economics: Economics is the branch of social science that deals with the production, distribution and consumption of goods and services and their management. It includes interest rates, gross national product, inflation, unemployment, inventories, as tools to predict the direction of the economy, etc.

Library is a nonprofit making institution. So, its service must be justified in terms of demand and uses. Economic theories are used for the evaluation of different types of reference sources. It is extensively used to study the document procuring and processing cost of the staff, cost of storage, cost of maintenance, cost of retrieval of information, overhead cost etc. It is also used for the cost benefit and cost effectiveness studies in the context of different services.

4. Education: Education encompasses teaching and learning specific skills and also something less tangible but more profound like the imparting of knowledge, good judgment and wisdom. It also imparts culture from generation to generation. Every seeker

of information is a student in one sense and they need initiation into the library and information system, tools and technique. The libraries and information centre also serves as institutions of informal education. Education teaches the library patron about how to use the library material through user education programme, gives assistance through reference services, and provides information service when the users need it. In addition, the subject education, works out programmes of education and training for the profession itself regarding the design and execution of courses, method of evaluation, certification, etc.

5. Law: Law is the combination of those rules and principles of conduct promulgated by legislative authority. It is derived from court decisions and established by local custom. In library environment there are also laws governing registration of newspaper and periodicals, ISBN / ISSN number, censorship, copyright, delivery of books act, transmission & communication of information, etc. Within the premises of library itself, library rules are in existence for the proper use of library material. Various states also have library legislation which enables the establishment, maintenance, financing and governing of the public library system within the states. In the computer environment also there are laws related to data flow, networking, and uses of information which are governed by special regulation. Library and Information Science demands the detailed study and evaluation of all these laws and its implementation in information science services.

6. Linguistics: Linguistics is the scientific study of human language. In the library environment linguistics is of great significance in information processing, indexing and abstracting of document, automatic indexing, artificial intelligence, machine translation etc. In the process of indexing, the indexer has to choose the terms from natural language by taking into consideration different syntactic and semantic problems as the phrase or word chosen should match the vocabulary of the text and the search terms of the user. Information science borrows from the linguistics languages that well suits the user.

7. Logic: Logic is the branch of philosophy that deals with the formal properties of arguments and the philosophical problems associated with them. It means gathering and reasoning; investigating the principles governing correct or reliable inference and deals with the canons and criteria of validity in thought and demonstration. The system of reasoning is applicable to any branch of knowledge or study. In Library and Information Science, it is used in the classification and indexing of document, and widely used in decision making by the librarian.

8. Management: According to ALA Glossary of Library and Information Science “management may be defined as the process of coordinating the total resources of an organisation towards the accomplishment of the desired goals of that organisation through the execution of a group of interrelated functions such as planning, organizing, staffing, directing and controlling. Management science helps in system analysis, system design, and system management and by this way helps in managing library and information science (LIS) centre most efficiently. It is responsible for deciding the line of

authority and the Learning outcomes of the institution, analyzing and describing a job and fixing policies for recruitment and so on.

9. Mathematics: Mathematics is the science dealing with quantity, form, measurement and arrangement and in particular, with the methods for discovering by concepts and by models the properties and interrelationship of quantities and magnitudes. Mathematics helps in programming as well as in the study of economics of information, estimation of cost, performance evaluation, etc. Various information models are needed in preparing different types of library software packages. Again, bibliometrics is a branch of Library and Information Science where mathematical principles are used to a great extent.

10. Philosophy: The term philosophy is drawn from a combination of the Greek words “philos” meaning love and “Sophia” meaning wisdom (love of wisdom). So, it is the study of the most general and abstract features of the world and categories with which we think: mind, matter, reason, proof, truth and so on. It is the tool for the generation and development of information.

11. Physics: Physics (from the Greek ‘phusikos’ which means natural and ‘phusis’ which means nature) is the science of Nature in the broadest sense. It is concerned with the study of the behavior and properties of matter in a wide variety of contexts, ranging from the sub-nuclear particles from which all ordinary matter is made (particle physics) to the behavior of the material universe as a whole (cosmology). Different types of machines that are widely used in the library are product of physics. It includes reprographic, automatic binding machine, etc.

12. Psychology: Psychology is the scientific study of human behavior (derived from the Greek word ‘psyche’ meaning breath, spirit, or soul and ‘logos’ means ‘study’), mental processes, and how they are affected and/or affect individuals or groups physical state, mental state, and external environment. Its goal is to describe, understand, predict, and modify behavior. Though it is largely concerned with humans, the behavior and thought of animals is also studied. Library and Information Centers have to provide information service based on user needs. But the users have different psychological temperaments, which makes knowledge of human psychology important in library and information science (LIS). The human psychology helps the Library and Information Science professional to understand the user correctly, analyze his/her problem or need precisely to provide the specific information in a form most suitable to him/her, and to treat the user appropriately. The knowledge of psychology is also important in designing and developing an information retrieval system as it helps to select a term which majority of the users is likely to use.

13. Sociology: Sociology, the study of the social lives of humans, groups, and societies, is sometimes defined as the study of social interactions. It concerns itself with the social rules and processes that bind and separate people not only as individuals, but as members

of associations, groups, and institutions. Library is a social institution. In Library and Information Science, sociology examines the legal and social aspects of information processing, transfer and use.

14. Statistics: Statistics is concerned with the collection, classification, analysis and interpretation of numerical facts or data. Statistics obtains data from a study of a large quantity of numerical data which need not be exact but should approximate the true value. Statistical methods in Library and Information Science help in improving the existing services of the library. The statistical analysis is used to assess the users' needs and ascertain their views on library services as well as to measure productivity of library staff, to justify the need of reference service to compute cost benefit analysis and to carry out library performance evaluation and so on.

Library and Information Science and other traditional subjects are inter-linked. It is a fact that other traditional subject benefit from information science. But in return it also gives its best to other subjects. It takes the sole responsibility of the literary heritage of other subjects via its document collection, conservation and preservation, dissemination and uses and by this way also helps in their subsequent generation of new information. Again, it is only the library that manages the literary heritages on which our modern civilization exists. Without the help of Library and Information Science, the society will again move to the traditional days of human civilization. In the case of the electronic environment, much of the information available over the internet as a whole is the product of the Library and Information Science or devised in consultation with the help of the Library and Information Science professional.

4.5 SUMMARY

Information science is a discipline that investigates the properties and behaviour of an information. Disciplines where information science has a relationship includes; chemistry which is the science of matter; computer science which is the study of computation; economics which is the branch of social science that deals with production and distribution, education which encompasses learning and teaching; law which is a combination of rules and principles; linguistic which is the scientific study of human language; mathematics which is the science of dealing with quantity, form and measurement , just to mention a few. From what you have learnt from this unit, you should be able to give the definition and explanation of information science and its relationship with other disciplines such as chemistry, computer science, economics, law, education, linguistics, logic, management and mathematics.

SELF ASSESSMENT EXERCISE

1. Name four disciplines that are tied to information science in a way
2. What is information science?

4.6 GLOSSARY

- **Information science** - Information science (also known as information studies) is an academic field of study primarily concerned with the analysis, collection, classification, manipulation, storage, retrieval, movement, dissemination, utilization, interpretation and protection of information
- **Sociology:** Sociology, the study of the social lives of humans, groups, and societies, is sometimes defined as the study of social interactions. It concerns itself with the social rules and processes that bind and separate people not only as individuals, but as members of associations, groups, and institutions.

4.7 REFERENCES/FURTHER READINGS

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4.8 POSSIBLE ANSWERS TO SELF – ASSESSMENT EXERCISES WITHIN THE CONTEXT

1) Four disciplines are;

- a) Statistics
- b) Psychology
- c) Mathematics
- d) Education

2) Information science is that discipline that investigates the properties and behavior of information, the forces governing the flow of information and the means of processing information for optimum accessibility and usability.