

**COURSE
GUIDE**

**LIS206
INTRODUCTION TO INFORMATION SCIENCE**

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INTRODUCTION

Welcome to **LIS 206: Introduction to Information Science**. This Course Guide is a brief description of what the course is about and the course material will give you the contents of what you are expected to learn in this course. It also contains some general guidelines on the amount of time you are expected to spend on each unit of this course in order to successfully complete the course. There is a separate Assignment File which contains detailed information on tutor-marked assignments that you are expected to answer at the completion of each unit.

WHAT YOU WILL LEARN FROM THIS COURSE

This course will give you in brief the awareness of the importance of Information Literacy in library and information science. The course will introduce you to the concept of information Science; importance of information science to information professionals; emergence and scope of information science, information lifecycle, principles of information processing storage and retrieval of human cognition, nature and characteristics of information explosion and overload, information theories, and models of information behaviour management, perspectives of information security in information science, storage and dissemination in information science, information system evaluation, organization and control in library science, internet and information science, role of information in modern society, relationship of information science with other disciplines.

COURSE AIM

The aim of this course is to prepare you towards the introduction to information science in Library and Information Science. This will be achieved by

- Introducing you to Information Science (IS).
- Helping you to appreciate how Information can be gotten easily by using a good search engine.
- Outlining Information science in library operations.
- Clarifying some basic concepts of Information science in library operations.

COURSE OBJECTIVES

To achieve the above aims, some general objectives were set for the course. The course is divided into units and each unit has specific objective at the beginning. You may want to refer to them during and after you might have completed a unit to check the pace of your

progress. The general objectives set below cover the whole course. By meeting these objectives, you should have achieved the aims of the course.

On successful completion of the course, you should be able to:

- Define and explain the emergence of Information Science (IS).
- Explain the different theories of information and information science
- Describe the information life cycle
- Explain the characteristics of information over load; processing storage and retrieval of human cognition.
- Explain the perspective of information security in information science
- Define the role of information in modern science as well as organization and control in library science
- Explain the relationship of information science with other disciplines

WORKING THROUGH THE COURSE

To complete this course, you are advised to read each study unit of this study material and read other materials, which may be provided by the National Open University of Nigeria (NOUN). Self-assessment exercises are included in each unit and you will be required to submit tutor-marked assignments for assignment purposes. There will be a final examination at the end of the course. The course will last for 22 weeks. The course will be divided into learnable units and you can allocate your own time to the units so that you can complete the course at a record time. You are advised to utilize the opportunity of tutorial sessions for comparing notes and sharing ideas with your colleagues.

COURSE MATERIALS

Major components of the course are:

- The Course Guide
- Study Units
- Assignments
- References /Further Reading
- Presentation Schedule

STUDY UNITS

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

Module 1 Basic Concepts

- Unit 1 Emergence and scope of Information Science
- Unit 2 Information Theories and Models of Information behaviour
- Unit 3 Information Cycle

Module 2 Conceptual Structure and Methodological of Information Science

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

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 System and Evaluation

Module 4 Information Representation in Library Science

- Unit 1 Organization and Control in library science
- Unit 2 Internet and Information Science
- Unit 3 Role of Information Society
- Unit 4 Relationship of Information Science with other Disciplines

Each unit consists of table of contents, introduction, and statement of objectives, main content, conclusion, summary and references. There are activities at every point that will assist you in achieving the stated objectives of the individual units of this course.

PRESENTATION SCHEDULE

Your course materials will spell out the important dates for early and timely completion and submission of your Tutor-Marked Assignments and for attending tutorials. You should bear it in mind that assignments should be submitted at the stipulated time and date. Make sure you do not lag behind in your work.

ASSIGNMENT FILE

There are at least twenty-one assignments in this course, that is, at least one assignment per unit. The assignment file contains all the works you

are to submit to your tutor/facilitator for marking. Your assignments are as important as your examinations and they carry 30% of the scores earmarked for the course.

ASSESSMENT

Assessment method will be two-folds. These are assignments and written examination. The course materials are prepared to assist you to do the assignments. You are expected to utilize the information and knowledge from the recommended texts at the end of each unit. The assignments will carry 30% of the total marks while the final examination of about three hours duration will be written at the end of the course and this will carry 70%.

TUTOR MARKED ASSIGNMENT (TMA)

The Tutor-Marked Assignment is a continuous assessment component of your course and it accounts for 30% of the total score. You are required to submit at least three (3 TMAs before you are allowed to sit for the end of course examination. Your facilitator will give you the TMAs and you are expected to return same to him/her as and when due.

Your assignment file contains the assignment questions for the units in this course. The information and materials contained in your reading, study units and references will assist you in completing your assignments. You should demonstrate that you have adequate knowledge of the materials read and that you have equally made further research into other references, which will give you a wider viewpoint as well as provide you a deeper understanding of the subject.

Ensure that each tutor-marked assignment reaches your facilitator on or before the deadline stated in the presentation schedule and assignment file. In case of any unforeseen circumstances that may hinder you from submitting your assignment before the due date, contact your facilitator before the assignment is due to discuss the possibility of an extension. Extension will not be granted after the due date.

FINAL EXAMINATION AND GRADING

The final examination for LIS 206 is about three hour's duration and it has a value of 70% of the total marks. The examination questions will reflect the type of self -testing, practice activities and tutor-marked assignments/problems that have previously been encountered in the course. All areas of the course will be assessed.

You could form a discussion group with a considerable number of your colleagues and practice or discuss the activities and assignment written in each unit before the examination period.

COURSE MARKING SCHEME

Assessment	Marks
Assignment 1-21 (best 3 out of all the assignment submitted)	Three assignment marked, each 10% totaling 30%
Final Examination	70% of Overall Course Score
Total	100% of Course Score

HOW TO GET THE MOST FROM THIS COURSE

- 1) In distance learning, the study units replace the university lecturer. The advantage is that you can read and work through the course materials at your pace, time and location or environment that suits you best. Think of it as reading the lecture instead of listening to the lecturer. Just as the lecturer might give you in-class exercise, this study unit provides appropriate exercises that will keep you abreast the pace of your progress in the course.
- 2) Each study unit is designed in peculiar format that will facilitate your learning. It starts with an introduction to the subject-matter of the unit and how a particular unit is integrated with the other units and the course as a whole. This is followed by the objectives. These objectives will let you know what you should be able to do by the time you have completed the unit. Use the objectives to assess your progress at the end of every unit.
- 3) The main body of the unit will serve as a roadmap that will guide you through the required reading from other sources. This is usually from either your references or from a reading section.
- 4) Self-activities are entrenched throughout the units and going through them religiously will help you to achieve the objectives of the unit and prepare you for the assignment and examination. Equally, go through each self-activity as you come across it in the study unit.
- 5) You can follow this practical strategy for working through the course. In case you run into problem, do not hesitate to telephone your tutor/facilitator or visit the study centre nearest to you. Note that your tutor/facilitator's job is to help you. When you need assistance, do not hesitate to call and ask your tutor/facilitator to provide it.

READ THIS COURSE GUIDE THOROUGHLY, IT IS YOUR FIRST ASSIGNMENT

- 1) Organize a Study Schedule - Design a 'course overview' to guide you through the course. Take note of the duration of every unit and the assignment related to it. Keep a diary of important information, e. g., details of your tutorials, duration of a semester, when you are to submit your assignment, etc. Map out your own schedule of work for each unit.
- 2) Once you have mapped out your study schedule, follow it religiously and stay focused. A major cause of failure is not keeping abreast with the schedule of work. If you get into any difficulty concerning your study, inform your tutor/facilitator on time.
- 3) Read the introduction and objectives of every unit before working through it.
- 4) Assemble the study materials. Information about what you need is given at the beginning of each unit. You will always need both the study unit you are working on and one of your textbooks on your desk at the same time.
- 5) Study critically the course information that will be continuously posted to you and do not fail to visit your Study Centre for up-to-date information.
- 6) Before the due dates (at least 4 weeks before the dates), visit your Study Centre for your next required assignment. Be assured that you will learn a lot by doing your assignment meet the objectives of the course and will definitely help you to pass your examination. Make sure your assignments are submitted not later than the due dates.
- 7) A revision of each study unit objectives will assist you to confirm whether you have achieved them. In case you are not sure whether you have achieved the objectives, review the study materials or consult your tutor/ facilitator. When you are sure that you have achieved the unit's objectives, you can proceed to the next unit. Go through the course unit by unit and ensure that you space your study in a manner that you can keep to the schedule.
- 8) Do not wait till your tutor return the submitted assignment before you proceed to the next unit. Keep to your schedule. When your assignment is returned, take note of your tutor's comments, both on the tutor-marked assignment form and also the written comments on the assignment. Consult your tutor/facilitator if you have any problem or questions.
- 9) After completing the last unit, review the course and get prepared for the final examination. Ensure that you have achieved the unit objectives (listed at the beginning of each unit) and the course objectives (listed on the Course Guide).

FACILITATION/TUTOR AND TUTORIALS

Facilitation/Tutorials shall be provided in support of this course. You will be notified of the dates, times and locations of these tutorials as well as the names and phone number of your facilitator, as soon as you are allocated a tutorial group.

Your tutor/facilitator will mark and comment on your assignment, keep close watch on your progress, on any difficulties you might encounter and provide assistance to you during the course. Ensure that you submit your tutor-marked assignments to your facilitator before the due date; at least two working days are required. Your assignments will be marked and returned to you as soon as possible. You can contact your facilitator on telephone, e-mail and discuss your problems whenever you need assistance. You may need to contact your facilitator if:

- You do not understand any part of the study or assigned readings.
- You have difficulty with the self-tests or activities.
- You have a question or problem with an assignment, with your tutor's comments or with the grading of an assignment.

Make it a point of duty to attend your tutorials regularly. This will afford you the opportunity of face-to-face contact with your course facilitator and to ask questions which are instantly answered. You can equally discuss any problem encountered in the course of your study. For maximum benefit from course tutorials, you can prepare a question list before attending them. You will learn a lot from participating in active discussion.

SUMMARY

This course will bring you the importance of Information Literacy to library and information science. At the end of the course you will achieve the objectives if you follow the instructions and do what you are expected to do.

**MAIN
COURSE**

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MODULE 1 BASIC CONCEPTS

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

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1.0	Introduction
2.0	Objectives
3.0	Main Content
3.1	How did Information Science evolve?
3.2	General characteristics of Information Science that are dominant in its evolution and existence
3.3	What is Information?
3.4	What is Information Science?
4.0	Conclusion
5.0	Summary
6.0	Tutor – Marked Assignment
7.0	References / Further Reading

1.0 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.

2.0 LEARNING OUTCOMES

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

- define Information
- define information science.
- discuss the general characteristics of information science
- explain briefly, the history of information science.

3.0 MAIN CONTENT

3.1 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 was 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; *informatiou*, *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 (Farradane, 1976 ; 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.

3.2 General characteristics of information science that is 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

3.3 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.

Zin (2007) defines the concept of information as closely related notions of constraint, communication control, data, form, instruction, knowledge, meaning, mental stimulus, pattern, perception and representation.

3.4 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 experts 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.

4.0 CONCLUSION

Having read through this unit, you should be able to discuss 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.

5.0 SUMMARY

This unit discussed how information science evolved since it was first introduced. In recent times, 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).

6.0 TUTOR MARKED ASSIGNMENT

1. When did information science become more prominent?
2. What are the three classical schools that evolved between the 1950s – 1980s?
3. Mention the six ways that information was spelt during the days of old French?
4. Who is an information scientist?

7.0 REFERENCES / FURTHER READING

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Bates, M. J. (1999) The invisible substrate of information science, *Journal of the American Society for Information Science*, 50(12), 1043–50.

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UNIT 2 INFORMATION THEORIES AND MODELS OF INFORMATION SCIENCE

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- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Definition of Terms
 - 3.2 Ellis' 1994 Behavioural Theory
 - 3.3 Affective Load Theory (ALT)
 - 3.4 Ranganathans Laws of Library Science
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignment
- 7.0 References / Further Reading

1.0 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.

2.0 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
- Explain Ranganathans Five Laws of Library

3.0 MAIN CONTENT

3.1 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.

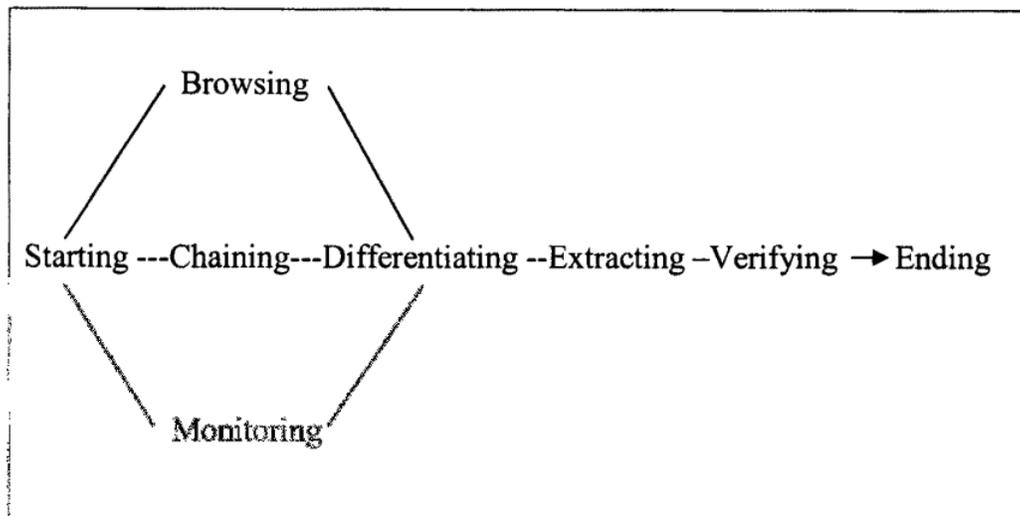
- i) **Meta –Theory:-** Meta – theory is a theory that is concerned with the investigation, analysis or description of theory itself.

- 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

3.2 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.

The eight (8) characteristics represent 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.
- 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 characteristics which involves tying up loose ends through a final search.

3.2 Affective Load Theory (ALT)

Affective load theory (ALT) is a social – behavioural perspective on the thoughts and feelings of individuals while engaged in information behaviour. ALT provides empirical methods for identifying affective states of users that disrupts ongoing cognitive operations (James & Nahl 1986). 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 behaviours:

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

3.3 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 behaviour. The model states that human information – seeking and using behaviour creates the situation that prompts the information need. The ISU model is made up of different situations and information seeking aspects that form the framework.

The seven situations are:

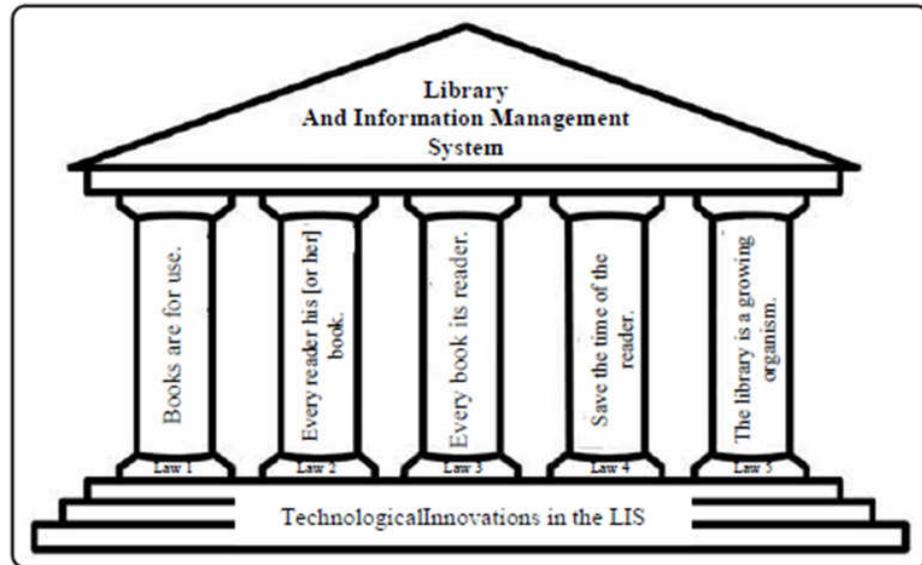
- a) Task initiating
- b) Focus forming
- c) Ideas assuming
- d) Ideas confirming
- e) Ideas rejecting
- f) Ideas finalizing
- g) Passing on of ideas

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.

3.4 Ranganathans 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:-



Source: - Illangarathne, (2015). Five pillars of modern library management 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. 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 his/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 needs. In addition, the second law of 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) Obligations of Library Staff
- d) Obligations of the Reader

iii) Every book its reader

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

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.

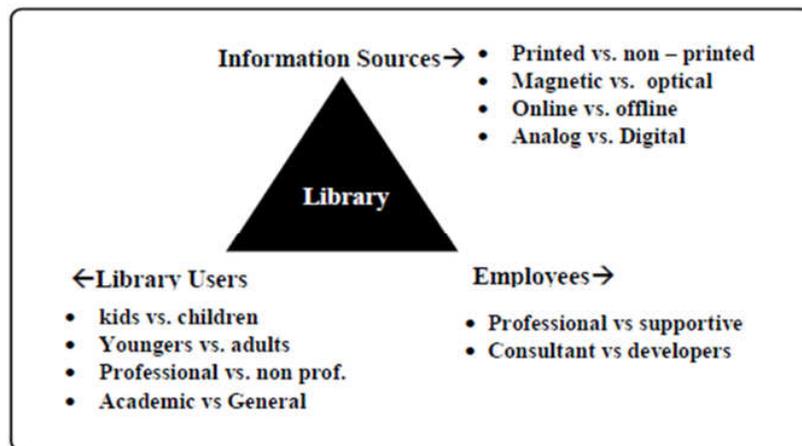
Key areas in saving the time of the user are:-

- 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**
 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



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

4.0 CONCLUSION

The models and theories of information behaviour 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 behaviour

5.0 SUMMARY

In this unit, you have learnt that there are different theories and models in information behaviour. Though different but the sole aim is information seeking by the user.

6.0 TUTOR MARKED ASSIGNMENT

1. What is the difference between meta- theory, theory and model?
2. Mention the eight (8) characteristics of Elis' behaviour?
3. What is the full meaning of ALT?
4. What are the three (3) essential ideas in applying ALT?
5. Explain Cheuk Wai – Yi's 1998 Information Seeking and using process model?
6. Explain in detail Ranganathans five laws of library science?
7. What are the three key areas where the library can grow like an organism?
8. Mention the key areas where the librarians can save time of the user?
9. What are the obligations of every book its reader?

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UNIT 3 INFORMATION LIFE CYCLE

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Contents
 - 3.1 Stages of the Research Life Cycle
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignment
- 7.0 References / Further Reading

1.0 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.

2.0 LEARNING OUTCOMES

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

- 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

3.0 MAIN CONTENT

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

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

Adapted and modified from Vaughn et al., 2013.

3.1.1 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 enable 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.

3.1.2 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.

3.1.3 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 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 involve 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 level should have their project / thesis or paper in the university's repository.

3.1.4 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.

3.1.5 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 are 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**
Tacking of research impact involves reporting your findings and requesting for a 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 institutions repository or any repository of their choice.

4.0 CONCLUSION

This unit concludes that research lifecycle is in five stages and those five stages are sub-divided into different segments.

5.0 SUMMARY

This unit summarized that research lifecycle is classified into idea development, funding, proposal, conducting and disseminating.

6.0 TUTOR MARKED ASSIGNMENT

1. Who is the founder of the research lifecycle?
2. Itemize the five (5) stages of the research lifecycle?
3. What are the sub-stages of idea development?
4. Explain the sub-stages of funding?
5. Define the sub-stages of proposal?
6. What are the sub-stages of conducting?
7. Explain the sub-stages of disseminating?

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**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**

CONTENTS

1.0	Introduction
2.0	Objectives
3.0	Main Content
3.1	General Principles / Assumptions of Information Processing
3.2	Types of Perception
3.3	The Stage Model
4.0	Conclusion
5.0	Summary
6.0	Tutor Marked Assignment
7.0	References / Further Reading

1.0 INTRODUCTION

2.0 LEARNING OUTCOMES

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

- define the principles of information processing
- explain the types of perception
- explain the stage model

3.0 MAIN CONTENT

3.1 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 behaviour 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

3.2 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.
- b) **Sound:** Sound is also known as hearing or auditions. It is the ability to perceive sounds by detecting vibrations.
- 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.
- d) **Taste:** Gustation is another term for Taste. It is the ability to perceive flavour of substances including food and other substances. The sensory organ that receives taste is called taste buds or gustatory calyculi.
- e) **Smell:** Smell is the process of absorbing molecules through the olfactory organs. The olfactory organ for absorbing molecules is through the nose.

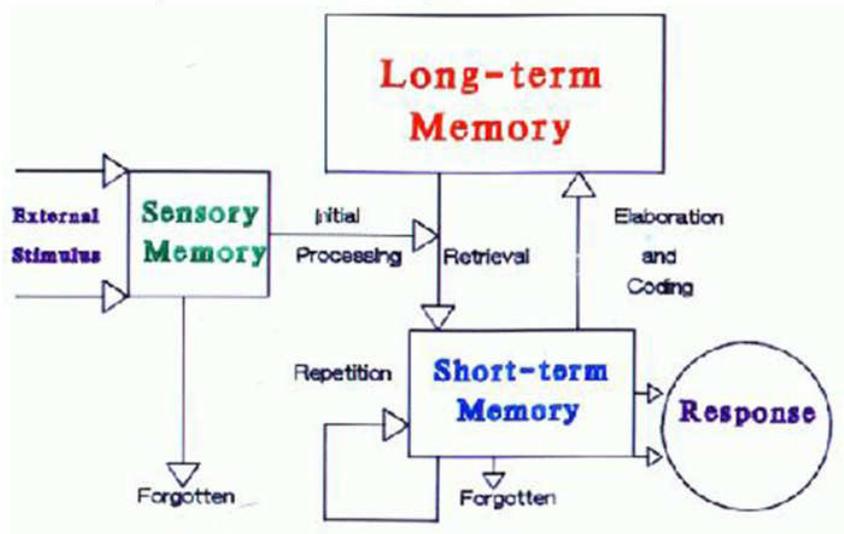
- f) **Social:** Social perception is the combination of vision, smell and touch perception respectively. It is the part of perception that allows people to understand the individuals and groups of their social world.

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

Figure - A Stage Model of Memory



Source: Atkinson and Shiffrin (1968)

- 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 are 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).

4.0 CONCLUSION

You have learnt from this study unit, the general assumption / principles of perceptions, major types of perception and three types of perception and the three major types of memory found in the stage model.

5.0 SUMMARY

This unit has discussed the general principles of perception, major types of perception and the three major types of memory found in the stage model.

6.0 TUTOR MARKED ASSIGNMENT

1. Itemize the general principles or assumptions of perception?
2. What are the major types of perception?
3. What are the three types of memory found in the stage model?

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UNIT 2 NATURE AND CHARACTERISTICS OF INFORMATION EXPLOSION AND OVERLOAD

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Nature of Information Overload
 - 3.2 Causes of Information Overload
 - 3.3 Consequences of Information Explosion
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignment
- 7.0 References / Further Reading

1.0 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.

2.0 LEARNING OUTCOMES

By 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

3.0 MAIN CONTENT

3.1 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.

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 someone has to break his/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.

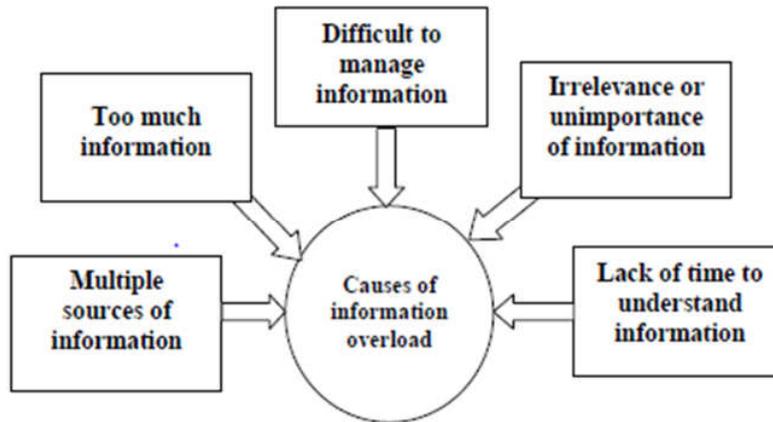
ii) Organizational overload

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

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).

3.2 Causes of Information overload

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



Source: Eppler and Menjies 2002

- a) Multiple sources of information:-
- b) Too much information
- c) Difficult to manage information
- d) Irrelevance or unimportance of information
- e) Lack of time to understand information

3.3 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.
- ii) Too much information leads to brain freeze or fatigue.
- iii) Shorter attention span
- iv) One thinks of the past and immediate future without adequate attention to the present.
- v) Information addiction
- vi) Long range thinking stops
- vii) Information contamination

In order to confront the problem of personal information overload, Elson further recommended the following:-

- a) Take regular information breaks from cell phones, e-mails, newspapers etc
- b) Call in experts to sift the corn from the shaft
- c) Serious self- examination of what is right or what is wrong and what is required
- d) Learn from what others are doing successfully
- e) Write shorter and precise memos and encourage others to do the same
- f) Invent personal solutions to information overload and if it works for you, share

4.0 CONCLUSION

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.

5.0 SUMMARY

This unit has discussed the definition of information overload, types of information overload, and causes of information overload as well as the consequences of information explosion.

6.0 TUTOR MARKED ASSIGNMENT

- 1) Define information explosion
- 2) Identify two types of information overload
- 3) What are the main causes of information overload
- 4) Mention seven consequences of information explosion

7.0 REFERENCES / FURTHER READING

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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

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main content
 - 3.1 Meaning of information security and its components
 - 3.2 Information security threats and how information security can be achieved in information science
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignment
- 7.0 References/Further Reading

1.0 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.

2.0 LEARNING OUTCOMES

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

- Explain the meaning of information security.
- Describe the components of information security.
- Discuss information security threats and how information security can be achieved in information science

3.0 MAIN CONTENT

3.1 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.

3.1.1 The components of information security

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

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.

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.

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.

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.

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.

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.

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.

3.2 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.

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

- **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 redesigned 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

- **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.

3.2.1 Types of new generation information security threats.

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

- **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

- **Social media attacks** – In these cyber criminals identify and infect a cluster of websites that persons of a particular organization visit, to steal information.
- **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.
- **Outdated Security Software** – With new threats emerging every day, updating in security software is a pre requisite to have a fully secured environment.
- **Corporate data on personal devices** – These days every organization 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 organizations are arguing to adopt this.
- **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.

3.2.2 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 organization.
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 organization, 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 net works.
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.

4.0 CONCLUSION

You have learnt from this study unit, the meaning of information security, components of information security, information security threats and how information security can be achieved in information science.

5.0 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.

6.0 TUTOR MARKED ASSIGNMENT

1. What is the meaning of information security?
2. List and explain the three pillars of information security.
3. List and discuss three information security threats.
4. List and discuss five measures to combat information security threats.

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All time cyber security Sunday, February 17, 2019

UNIT 2 STORAGE AND DISSEMINATION IN INFORMATION SCIENCE

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main content
 - 3.1 Definition of storage
 - 3.2 Information dissemination in information science
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignment
- 7.0 References/Further Reading

1.0 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 organizations (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 organizations.

This information are 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.

2.0 LEARNING OUTCOMES

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

- Define storage and dissemination of information.
- Discuss types of storage devices.
- Explain how stored information can be disseminated.
- Discuss various methods of disseminating information.

3.0 MAIN CONTENT

3.1 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).
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.
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.

3.1.1 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.

3.1.2 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.

3.1.3 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.

3.1.4 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.

3.1.5 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

3.2 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. The main issue for information dissemination is that a simple query or on-demand methodology for dissemination of information does not suit VANETS, due to their high mobility and network portions.

3.2.1 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.

4. Presenting programme results to local community groups and other local stakeholders.
5. Creating and distributing programme materials, such as flyers, guides, pamphlets and DVDs.
6. Creating toolkits of training materials and curricula for other communities.
7. Sharing information through social media or on an organization's website.
8. Summarizing findings in progress reports for funders.
9. Disseminating information on an organization's website.
10. Discussing project activities on the local radio.
11. Publishing information in the local newspaper.
12. Issuing a press release.

4.0 CONCLUSION

You have learnt from this unit, storage and dissemination of information in information science. The types of storage, its advantages and disadvantages, the meaning of dissemination, its importance and methods of dissemination of information.

5.0 SUMMARY

This unit has discussed extensively the meaning of storage, its types, importance, the advantages and disadvantages of the types of storage devices. Also discussed were the meaning of dissemination and methods of dissemination of information.

6.0 TUTOR MARKED ASSIGNMENT

1. What is storage of information?
2. How many types of storage device do we have?
3. List five importance of storing information.
4. List five methods of disseminating information.

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UNIT 3 INFORMATION SYSTEM AND EVALUATION

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- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main content
 - 3.1 Definition of information system
 - 3.2 Evaluating an information system
- 4.1 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignment
- 7.0 References/Further Reading

1.0 INTRODUCTION

Information systems are formal, socio-technical, organizational 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.

2.0 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.

3.0 MAIN CONTENT

3.1 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 organization. It is an integrated set of components for collecting, storing, and processing data and for providing information, knowledge, and digital products. Organizations rely on information systems to carry out and manage their operations. By the mid-sixties several organizations 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 organizations 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 organizations 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 organization 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 organizations. 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.

3.1.1 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.

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.

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.

3.1.2 The components of an information system

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

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.

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.

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.

Data

In information system (IS), data can be both processed and an unprocessed information as one organization may require data from another. Hence, the information system output of an organization may be the information system input of the other. Data may represent valuable resources of an organization. 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.

Networks

The interconnection of multiple devices such as computers, telecommunications networks, multi-media, and miniature devices used by organizations' 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.

3.2 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.

3.2.1 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:

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?

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?

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?

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.

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?

In conclusion, the choice of an information system can be critical for any organization. An information system is an investment for the effective management of your organization and of course, students' future success in a complex and technology-driven world. Therefore, it is very necessary that when an organization wants to acquire an information system, the above criteria should be considered.

4.0 CONCLUSION

From what you have learnt in this unit, you should be able to define information system, components of information system. You should also be able to discuss the criteria for evaluating the effectiveness of an information system.

5.0 SUMMARY

This unit has defined information system, the components of an information system and the criteria for evaluating the effectiveness of an information system.

6.0 TUTOR MARKED ASSIGNMENT

1. Define information system.
2. Mention the components of an information system.
3. List five criteria for evaluating an information system.

7.0 REFERENCES/FURTHER READING

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Oluwaseun Babarotimi Opeyemi Foundations of Library and Information Systems, Institution and Services.

MODULE 4 INFORMATION REPRESENTATION IN LIBRARY SCIENCE

- Unit 1 Organization 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 ORGANIZATION AND CONTROL IN LIBRARY SCIENCE

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 - 3.1 Organization in Library Science
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1.0 INTRODUCTION

Organization 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 organization.

According to Okoro in Uzoigwe (2004), in the absence of organization, “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 organization 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.

2.0 LEARNING OUTCOMES

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

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

3.0 MAIN CONTENT

3.1 Organizational 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.

3.1.1 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.

3.1.2 Types of Classification Schemes

The following are the classification schemes used for the organization 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.

3.1.3 Cataloguing as a tool for organization 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.

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.

Importance of Organization - 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.

3.1.4 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.

3.2 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.

3.2.1 Forms and Types of Bibliography

Forms of Bibliography

According to Edoka, 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).

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 Edeka (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 forth coming 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.

3.2.2 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, bibliography 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.

4.0 CONCLUSION

You have learnt in this study unit, the organization and control in library science. The tools for the organization and control in library science were extensively discussed.

5.0 SUMMARY

This unit has discussed organization and control in library science, the tools that aid the organization 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.

6.0 TUTOR MARKED ASSIGNMENT

1. Mention and discuss the two processes that aid the organization of library materials.
2. List and discuss five classification schemes.
3. What is Bibliographic control?
4. Discuss briefly National, Trade and subject bibliographies.

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UNIT 2 INTERNET AND INFORMATION SCIENCE

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main content
 - 3.1 Internet and information science
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignment
- 7.0 References/Further Reading

1.0 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.

2.0 LEARNING OUTCOMES

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

- define internet.
- state the impacts of internet on information science.

3.0 MAIN CONTENT

3.1 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.

1.1.2 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 organizational 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 & organizations 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.

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/ Hypertext/ Hypermedia based.
- Provides unlimited access to large universe of e-documents

Other tools include:

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

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, Organizations, Associations etc.

4.0 CONCLUSION

From what you have learnt from this unit, you should be able to discuss the internet and its impacts on information science.

5.0 SUMMARY

This unit has explored the internet and information science. Specific impacts of the internet on library services were highlighted and discussed.

6.0 TUTOR MARKED ASSIGNMENT

1. Define Internet.
2. List and explain five advantages of the internet to a researcher.
3. Discuss five challenges affecting the use of the internet.

7.0 REFERENCES/FURTHER READING

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EDN Staff (1995) Top 10 uses of the Internet available at <https://www.edn.com/electronics-news/4351406/top-10-uses-of-the-internet>

UNIT 3 THE ROLE OF INFORMATION IN MODERN SOCIETY

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main content
 - 3.1 Concept and Definition of Information
 - 3.2 The Role of Information in Modern Society
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignment
- 7.0 References/Further Reading

1.0 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, organization, 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.

2.0 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.

3.0 MAIN CONTENT

3.1 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:

According to Bell, information is facts, news, statistics, reports, legislation, text code, judicial decision, resolutions and the like.

According to Rowley and Turner, “information is the data which is transmitted between individuals and each individual can make whatever use he can of it”. Vishwanathan defines information as “knowledge put to use, which may produce good or bad results”.

According to Mohammed, 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.

3.1.1 Characteristics of Information

Information is a basic resource for the development of individuals, organization, 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.

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.

3.1.3 Kinds of Information

There are different kinds of information depending on the various needs of the individual or organization 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, objectives 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 organization.

The kinds and types of information is inexhaustible as information is generated every day 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 organizations, to make informed decisions, to conduct research e.t.c. and thus achieve the overall sustainable development of a nation.

3.2 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 e.t.c.
- 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 ones 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.

4.0 CONCLUSION

This unit has discussed the role of information in a modern society. The unit has discussed the concepts and definitions of information, characteristics of information, kinds of information and the contributions of information to the development of a modern society.

5.0 SUMMARY

In this unit, you were taught the meaning of information, characteristics of information, kinds of information and the role of information in a modern society.

6.0 TUTOR-MARKED ASSIGNMENT

1. Define information.
2. Mention three kinds of information.
3. List and explain five roles of information in a modern society.

7.0 REFERENCES\FURTHER READING

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UNIT 4 RELATIONSHIP OF INFORMATION SCIENCE WITH OTHER DISCIPLINES

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Definition of Information Science as a Discipline
 - 3.2 Relationship of Information Science with other Disciplines
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignment
- 7.0 References/Further Reading

1.0 INTRODUCTION

Information science is an important and valuable interdisciplinary and multidisciplinary discipline responsible for several information activities, such as information collection, selection, organization, 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.

2.0 LEARNING OUTCOMES

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

- define information as a discipline.
- explain the relationship of information science with other disciplines.

3.0 MAIN CONTENT

3.1 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, organization, 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, and scholars' e.t.c to get well informed with the current advancements in their subjects and to keep them up-to-date.

3.2 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.
2. **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.

3. **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.
4. **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.
5. **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 suit the user.
6. **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.
7. **Management:** According to ALA Glossary of Library and Information Science “management may be defined as the process of coordinating the total resources of an organization towards the accomplishment of the desired goals of that organization 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 objectives of the institution, analyzing and describing a job and fixing policies for recruitment and so on.
 8. **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.
 9. **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.
 10. **Physics:** Physics (from the Greek ‘phusikos’ which means natural and ‘physis’ 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.
 11. **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.

12. **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.
13. **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.

4.0 CONCLUSION

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.

5.0 SUMMARY

This unit has discussed the meaning of information science. It also explained extensively the relationship of information science with other disciplines.

6.0 TUTOR MARKED ASSIGNMENT

1. Define information science.
2. Use three disciplines to explain their relationship with information science.

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