Information Sources in Science and Technology

LIS 315

University of Ibadan Distance Learning Centre
Open and Distance Learning Course Series Development
Vice-Chancellor’s Message

The Distance Learning Centre is building on a solid tradition of over two decades of service in the provision of External Studies Programme and now Distance Learning Education in Nigeria and beyond. The Distance Learning mode to which we are committed is providing access to many deserving Nigerians in having access to higher education especially those who by the nature of their engagement do not have the luxury of full time education. Recently, it is contributing in no small measure to providing places for teeming Nigerian youths who for one reason or the other could not get admission into the conventional universities.

These course materials have been written by writers specially trained in ODL course delivery. The writers have made great efforts to provide up to date information, knowledge and skills in the different disciplines and ensure that the materials are user-friendly.

In addition to provision of course materials in print and e-format, a lot of Information Technology input has also gone into the deployment of course materials. Most of them can be downloaded from the DLC website and are available in audio format which you can also download into your mobile phones, IPod, MP3 among other devices to allow you listen to the audio study sessions. Some of the study session materials have been scripted and are being broadcast on the university’s Diamond Radio FM 101.1, while others have been delivered and captured in audio-visual format in a classroom environment for use by our students. Detailed information on availability and access is available on the website. We will continue in our efforts to provide and review course materials for our courses.

However, for you to take advantage of these formats, you will need to improve on your I.T. skills and develop requisite distance learning Culture. It is well known that, for efficient and effective provision of Distance learning education, availability of appropriate and relevant course materials is a *sine qua non*. So also, is the availability of multiple platform for the convenience of our students. It is in fulfilment of this, that series of course materials are being written to enable our students study at their own pace and convenience.

It is our hope that you will put these course materials to the best use.

Prof. Abel Idowu Olayinka
Vice-Chancellor
Foreword
As part of its vision of providing education for “Liberty and Development” for Nigerians and the International Community, the University of Ibadan, Distance Learning Centre has recently embarked on a vigorous repositioning agenda which aimed at embracing a holistic and all encompassing approach to the delivery of its Open Distance Learning (ODL) programmes. Thus we are committed to global best practices in distance learning provision. Apart from providing an efficient administrative and academic support for our students, we are committed to providing educational resource materials for the use of our students. We are convinced that, without an up-to-date, learner-friendly and distance learning compliant course materials, there cannot be any basis to lay claim to being a provider of distance learning education. Indeed, availability of appropriate course materials in multiple formats is the hub of any distance learning provision worldwide.

In view of the above, we are vigorously pursuing as a matter of priority, the provision of credible, learner-friendly and interactive course materials for all our courses. We commissioned the authoring of, and review of course materials to teams of experts and their outputs were subjected to rigorous peer review to ensure standard. The approach not only emphasizes cognitive knowledge, but also skills and humane values which are at the core of education, even in an ICT age.

The development of the materials which is on-going also had input from experienced editors and illustrators who have ensured that they are accurate, current and learner-friendly. They are specially written with distance learners in mind. This is very important because, distance learning involves non-residential students who can often feel isolated from the community of learners.

It is important to note that, for a distance learner to excel there is the need to source and read relevant materials apart from this course material. Therefore, adequate supplementary reading materials as well as other information sources are suggested in the course materials.

Apart from the responsibility for you to read this course material with others, you are also advised to seek assistance from your course facilitators especially academic advisors during your study even before the interactive session which is by design for revision. Your academic advisors will assist you using convenient technology including Google Hang Out, You Tube, Talk Fusion, etc. but you have to take advantage of these. It is also going to be of immense advantage if you complete assignments as at when due so as to have necessary feedbacks as a guide.

The implication of the above is that, a distance learner has a responsibility to develop requisite distance learning culture which includes diligent and disciplined self-study, seeking available administrative and academic support and acquisition of basic information technology skills. This is why you are encouraged to develop your computer skills by availing yourself the opportunity of training that the Centre’s provide and put these into use.
In conclusion, it is envisaged that the course materials would also be useful for the regular students of tertiary institutions in Nigeria who are faced with a dearth of high quality textbooks. We are therefore, delighted to present these titles to both our distance learning students and the university’s regular students. We are confident that the materials will be an invaluable resource to all.

We would like to thank all our authors, reviewers and production staff for the high quality of work.

Best wishes.

Professor Bayo Okunade
Director
Course Development Team

Content Authoring
Babarinde Adefunke

Content Editor
Prof. Remi Raji-Oyelade

Production Editor
Ogundele Olumuyiwa Caleb

Learning Design/Assessment Authoring
Famaye Tolulope

Managing Editor
Ogunmefun Oladele Abiodun

General Editor
Prof. Bayo Okunade
General Introduction and Course Objectives

This course titled Information Sources in Science and Technology is aimed at:

1. Providing people who can apply scientific knowledge to the improvement and solution of environmental problems for the use of information dissemination for the use and convenience of man.
2. Assisting the user of information sources in the most effective use of the resources by providing specific exhaustive and prompt information on demand and in anticipation.
3. Enabling the materials to be learner centred, taking cognizance of their peculiar situation and sustaining their interest.
4. Giving adequate training and imparting the necessary skills leading to the production of information scientists and technologists who will be enterprising and self-reliant.
5. Enabling young men and women to have intelligent understanding of the increasing complexity of information sources in the field of science and technology.
6. Enabling people to know their rights, how they can influence what is happening locally, nationally and internationally.
7. Maximizing the communication of information to end-uses in a social act, which is determined by the availability of methods of communication which can convey the information effectively using signals, such as speech, body movement, computer, e-mail, fax, internet world wide web (www), journals, periodicals, and reference materials.

Course objectives

The overall objectives of this course are:

1. To demonstrate the understanding of the parameters within which information sources could be identified.
2. To understand the basis of the evolution of information sources in science and technology.
3. To explain the implication of the kind of concepts a user holds to himself regarding his searches.
4. To explain the different channels of information sources in the field of science and technology.
5. To discuss the use of ICT in Science and Technology.
6. To discuss the status of information science in Nigeria.
Table of Contents

Study Session 1: The Concepts of Information, Information Science and Information Professionals

- Introduction ........................................................................................................................................ 1
- Learning Outcomes for Study Session 1 ......................................................................................... 1

  1.1. The Concept of information, Role of Libraries and ICT .......................................................... 2
  1.2. Information Professionals ........................................................................................................ 4
  1.3. Departments in a Library ......................................................................................................... 7
  1.4. Responsibilities of a Librarian ................................................................................................. 8

- Summary for Session 1 .................................................................................................................. 9
- Self-Assessment Questions for Study Session 1 ......................................................................... 9

Study Session 2: Information Needs and Re-Packaging

- Introduction ......................................................................................................................................... 11
- Learning Outcomes for Study Session 2 ....................................................................................... 11

  2.1. Meaning of Information Need and the Associated Factors ...................................................... 12

  2.2. Repackaging Information to meet a User’s Need ..................................................................... 15

- Summary for Session 2 .................................................................................................................. 18
- Self-Assessment Questions for Study Session 2 ......................................................................... 19

Study Session 3: Information System and Its Components

- Introduction ......................................................................................................................................... 21
- Learning Outcomes for Study Session 3 ....................................................................................... 21

  3.1. Meaning and Components of Information System .................................................................. 22

- Summary for Session 3 .................................................................................................................. 24
- Self-Assessment Questions for Study Session 3 ......................................................................... 24

Study Session 4: Channels of Information in Science and Technology

- Introduction ......................................................................................................................................... 26
- Learning Outcomes for Study Session 4 ....................................................................................... 26

  4.1. Information Channels for Scientists and Technologists ............................................................ 26

  4.2. Communication and Growth of Information ......................................................................... 27

- Summary of Session 4 .................................................................................................................. 30
- Self-Assessment Questions for Study Session 4 ......................................................................... 31

Study Session 5: Sources of Information in Science and Technology

- Introduction ......................................................................................................................................... 33
- Learning Outcomes for Study Session 5 ....................................................................................... 33
<table>
<thead>
<tr>
<th>Study Session 5: Sources of Information in Science and Technology</th>
<th>33</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study Session 6: Reference Sources in Science and Technology (I)</td>
<td>39</td>
</tr>
<tr>
<td>Study Session 7: Reference Sources in Science and Technology (II)</td>
<td>45</td>
</tr>
<tr>
<td>Study Session 8: Compilation of a Bibliography</td>
<td>53</td>
</tr>
<tr>
<td>Study Session 9: Indexing</td>
<td>62</td>
</tr>
<tr>
<td>Study Session 10: Abstract Services</td>
<td>69</td>
</tr>
</tbody>
</table>
Study Session 1: The Concepts of Information, Information Science and Information Professionals

Expected Duration: 1 week or 2 contact hours

Introduction
This is LIS 315 course where you will be fully exposed to the information sources in Science and Technology. Have you had certain moments during your course of study when you needed to source for certain information to solve a problem, carry out a class assignment or answer a question. What was some of the steps you took to get the information you needed? Did you visit a library, browse the internet or ask a friend? Based on this assumption, you would agree with me that information sources are numerous in today’s society because the 21st century we live in is known as the age of information. The modernization of information and communication processes has become the driving force of social evolution. At this point, it is essential for you to know that Information is very key in every aspect of life and is the bedrock of technology in this 21st century. Information science is an inter-disciplinary field incorporating diverse fields such as computer science, archival science, technology, law, mathematics, library science, management, philosophy and the social sciences. It is primarily concerned with the origination, collection, organization, storage, retrieval, interpretation, dissemination and use of Information. Channels of information development by scientists are made available to the world through journals, periodicals, conference proceedings, reviews, e-mails, fax, World Wide Web (www) etc. In fact, a multitude of sources of information in science and technology are found. However, this session has been designed to enrich your knowledge of the concept of information and information science and the job of the information professional.

Learning Outcomes for Study Session 1
When you have studied this session, you should be able to:
1.1 Define and use correctly all the keywords printed in bold (SAQ 1.1 and 1.3)
1.2 Explain the channels of information development (SAQ 1.3)
1.3 Identify the role of the library and technology in dissemination of information (SAQ 1.4)
1.4 Discuss the role of an information professional (SAQ 1.1)
1.5 Highlight and discuss the several disciplines of an information professional (SAQ 1.1)
1.6 State the departments of a library and discuss the functions of each. (SAQ 1.2)

Keywords: information, information science, information professional

The Concept of information, Role of Libraries and ICT

The Concept of Information

Information is an asset necessary for the development and prosperity of an individual, group, society, organization and country. In fact, a country is considered prosperous if it is rich in information especially in the field of science and technology. Information can be defined in several ways since it means different things to different people. Information can be defined as data, facts, images and things of the like, which are transmitted from one person (the source) to another (the receiver), through a medium (print, non-print and electronic) and which enables the recipient dispel ignorance and make rational decisions. (Nwalo, 2009).

Therefore, information science investigates the properties and the means of processing information for optimum accessibility and usability. The process includes the origination, collection, organization, storage, retrieval, interpretation, dissemination and use of information. Thus, information is an assemblage of data in comprehensible form capable of communication which use facts to which meaning has been attached (Olabisi, 2002). As stated earlier, Information plays a significant role in all aspects of human activity; whether it is research and development, business and industry, government affairs, education or training. In the field of science of technology, information has the power to convert natural resources into usable and consumable products. Since individuals must work in an information communication environment of their own, an accurate assessment of the information need of users should be made. Different categories of users have different information needs and sources of information are based on careful assessment of information needs.

As you progress gradually in this study session, it is noteworthy that the Library is a valuable information centre which provides various information resources for its clientele. You can learn more in section 1.1.2.
Role of libraries

One of the major objectives of the library no matter the type, is to inform and enlighten the citizenry. An informed society is a progressive society. In performing the information role, the library either acquires or serves as a gateway to all types of information needed by members of the society for their daily activities, no matter the calling. In schools, research institutes and tertiary institutions, the library provides literature support to teaching, learning, research and community services of the parent institutions. This, however, depends on the preoccupation of each level of institution for which the library was established. The information role of libraries is performed by making the needed information available providing access to information outside the confines of the library building, answering user queries and other forms of reference services. By informing the society, the library presents an essential part in the chain of human communication as shown in Figure 1.1.

Another fact that must be recognised here is that the information resources of the library are not useful to society unless they have been easily accessed and effectively utilized. Therefore, the library that facilitates the full exploitation of information and knowledge contained in books is a key player in the chain of human communication since the latter is considered not to have taken place unless a message from a sender through a medium has been received as displayed in fig 1.1.

In-text Question

- Recall that Information science was earlier stated in this lecture, to assess your knowledge of the concept of information, what do you think information has to do with science?
  - You should be able to infer from the discussion that information is scientific in nature because information is an assemblage of data in comprehensible form capable of communication. You can check details in section 1.1.1.

Figure 1.1 The chain of human communication in a library process
Box 1.1. The Concept of Information

- Information can be defined as data, facts, images and things of the like, which are transmitted from one person (the source) to another (the receiver), through a medium (print, non-print and electronic) and which enables the recipient dispel ignorance and make rational decisions.
- Information science investigates the properties and the means of processing information for optimum accessibility and usability. The process includes the origination, collection, organization, storage, retrieval, interpretation, dissemination and use of information.

The discussion on the concept of information will remain unjustified without making reference to the role of information technology. You will better appreciate IT as you consider this next section.

Role of Information Technology

Following the birth of Information Technology, the rapid development of electronic information and telecommunication systems combined with improvements in input and output devices and storage media, new technologies of high volume, low cost storage of data base, including multimedia has made a significant impact to the work of the researchers as many conventional activities has been made seamless. Microcomputers are proving to be versatile devices used by individual scientists and engineers for both document creation and retrieval of information from database. Olabisi (2002). Another scholar added that the internet, a worldwide system of interconnected computer networks allows access to information sources all over the world from a desktop computer work station. Software tools for navigation and retrieval improves access to distributed resources, including data, images, sounds, texts and computer programmes, McGraw-Hill (1997).

As you move on to another section of your study, you must have heard of some professionals such as Information scientist, Archivist, Information system Analyst and designer, Information manager, Information broker, etc. These set of individuals are called Information Professionals and some of their duties will be revealed in section 1.2

Information Professionals

An information professional is an individual who preserves, organizes and disseminates information. Information professionals are skilled in the organization and retrieval of recorded knowledge. Traditionally, their work has been with print materials, but these skills are being increasingly used with electronic, visual, audio and digital materials. Information professionals work in a variety of public, private, non-profit and academic institutions in any of the following capacities: Information scientist,
Archivist, Information system Analyst and designer, Information manager, Information broker, Journalist, Editor, Curator, Educator or Librarian. The distinguishing features between these information professionals will be discussed as stated:

1. **Information scientist**
   An information scientist is an individual, usually with a relevant subject degree or high level of subject knowledge, providing focused information to scientific and technical research staff in an industry, a role quite distinct from and complementary to that of a librarian. He/she is concerned with the theory and nature of information, the study and nature of information, the study of operations and technology required for the collection, transfer and dissemination of information. The information scientist is also interested in all the processes and methods involved in all the activities of information. The title also applies to an individual carrying out research in information science.

2. **Archivist**
   This is the professional who is responsible for supervising the records that are kept in the archives by ensuring that they are properly stored and preserved for future use.

3. **Information System Analyst and Designer**
   This professional analyses the problems in an information system and then designs appropriate systems and networks for solutions. The analyst/designer is concerned mainly with the generation, transfer, analysis and use of information.

4. **Information Manager**
   This professional is responsible for planning, coordinating and supervising the human and material resources in an information system.

5. **Information Broker**
   This professional usually searches for information on behalf of others for a fee, thus, an information broker is an intermediary. This professional is concerned with the research, analysis, packaging and distribution of information.
6. **Journalist**
This is a professional who is responsible for the collection, writing and packaging of information for communications and media houses. This will be disseminated to groups of people scattered over long distances.

7. **Editor**
This professional provides added value to recorded information already generated by improving the content and style, and also ensuring that written or electronic documents conform to acceptable standards.

8. **Curator**
This information professional preserves and cares for the artefacts stored in a museum or gallery. The curator is the guardian and custodian of a museum. The main task is essentially to collect artefacts that are relevant to the immediate community, and ensure their preservation.

9. **Educator**
This information professional could be a lecturer, a consultant or a training officer who is involved in teaching potential information professionals in formalized and non-formalized training institutions.

10. **Librarian**
This is the professional who is concerned with the collection, storage, processing and dissemination of recorded knowledge in a library. He is involved in selection of books and non-book materials which comprises its stock and providing information and loan service for legal practice, set up new library, new indexing system and introducing new library technology. A librarian can work in any of the departments of a library as depicted in Figure 1.2.

**In-text Question**
- During your visit to the National Museum in Lagos, your tour guide introduced you to someone who he called the curator. How will you describe his job based on the chat you had with him while at the museum?
  - He specializes in collecting and preserving the artefacts in a museum. (You may refer to section 1.4 for more explanation on this)
Departments in a Library

The Library is known to be the hub for various information resources for several fields of study. The discussion here identifies some of the departments available in the Library as shown in fig 1.2. and the functions exhibited by these departments. They are;

a. **Technical Services Librarian:** This is the librarian in charge of the technical services division of a library. The technical services section comprises of the serial, cataloguing and classification section, the acquisition section and bindery/reprography section of the library.

   i. Acquisition librarian: He oversees acquiring printed, non-printed and electronic materials to the library. He is also in charge of purchase, exchange, bequeath, gifts/donations that adds to the library collection.

   ii. Collection Development Librarian: He works in collaboration with the acquisition librarian. He selects library materials to be purchased by the acquisition librarian and ensures that library materials acquired undergo good physical format for library use.

   iii. Cataloguers: Cataloguing is the description of a book, pointing out its important bibliographic details such as author, title, sub-title, parallel title (title in another language), edition, editor, publisher, place of publication, date of publication, series, subject and collation. The librarians involved in cataloguing and classification are referred to as cataloguers.

   iv. Serial librarian: They are the librarians in charge of periodicals e.g. journals, newspapers, magazines newsletters etc. They catalogue their materials themselves.

   v. Binder: They are involved in binding deteriorated materials to preserve them for use.

b. **Readers’ Service Librarian:** This is the librarian in charge of the readers’ service division of a library. The readers’ service division comprises of reference and circulation section.

   i. Reference librarian: He is the librarian in charge of reference section of the library. He answers user query, compiles reading lists and bibliographies and involved in user education.

   ii. Circulation librarian: He is in charge of the circulation section of the library. He ensures that users duly registered with the library are involved in charging and discharging of books, shelving and shelve reading, treatment of over dues and supervises the junior staff at the desk.
**Figure 1.2 Library Organogram**

**In-text Question**
- Chioma needed a list of books which she can select from in doing her assignment. On her visit to her school library, she was asked to meet the cataloguer. What is expected of the cataloguer in attending to Chioma?
  - The cataloguer provides information for certain books, pointing out its important bibliographic details such as author, title, sub-title, parallel title (title in another language), edition, editor, publisher etc.

*As you approach the end of this study session, you can also consider the responsibilities of a Librarian as provided here.*

**Responsibilities of a Librarian**

As a Librarian, the following must always be taken into consideration:

a. It is important for the librarian to be familiar with general reference and bibliographic sources that can help the scientists or technologist in his field. The librarian in a science and technology library will need to have a grasp of the over-all pattern of the literature of science and technology.
b. It is also the responsibility of the librarian to have some knowledge of the discipline with which he/she is concerned and be able to select materials for his user community and give them a good reference services. Olabisi (2002).

**Activity 1.1.**  
*Time Allowed: 10minutes*  
Take a moment to examine fig 1.2 and write out the functions of each department in a Library.

**Activity 1.1. Feedback**  
You can revisit section 1.3. before you embark on this activity.

**Summary for Session 1**

**In this session, you have learned that;**

1. Information is very necessary because a person, organisation or country is considered prosperous if it is rich in information especially in the field of science and technology.
2. Information is data which is transmitted from one person to another through a medium which enables the recipient dispel ignorance and make rational decisions.
3. An information professional is an individual who preserves, organizes and disseminates information.
4. Information professionals work in a variety of public, private, non-profit and academic institutions as information scientists, archivists, journalists, curators educators or librarians.
5. One of the major objectives of the library is to provide information to the public.
6. Technology is also very instrumental to the provision or information to the populace.
7. The library is divided into two major departments; technical services department and readers’ services department.
8. The librarian must be familiar with general reference and bibliographic sources and have some knowledge of the discipline with which he/she is concerned in order to be able to select materials for his user community and give them good reference services.

**Self-Assessment Questions for Study Session 1**

Now that you have completed this study session, you can assess how well you have achieved its Learning Outcomes by answering the questions below. You can check your answers with the Notes on the Self-Assessment Questions at the end of this material.
SAQ 1.1 (tests Learning Outcomes 1.1, 1.4 and 1.5)
Briefly discuss who an information professional is and state five (5) disciplines under Information Science.

SAQ 1.2 (tests Learning Outcome 1.6)
With the aid of a diagram, represent the departments and sub-departments of a library and discuss the duties of each of these departments.

SAQ 1.3 (tests Learning Outcomes 1.1 and 1.2)
Explain the concept of information and discuss the channels of information.

SAQ 1.4 (tests Learning Outcome 1.3)
Explain the role of the library and technology in dissemination of information.

References
Study Session 2: Information Needs and Re-Packaging

*Expected Duration: 1 week or 2 contact hours*

**Introduction**

You are welcome back for your last study unit where you are expected to have enriched your knowledge on the concept of Information as it will be helpful as you progress in this study. You need be conscious of the fact that as the human body receives a lot of signals from the environment to the brain, which in turn selects and synthesizes those that are useful to the working of the body system and rejects those that are not necessary, so does every human being, no matter his level of education, sophistication, affluence and location needs and selects information from the environment which he applies to the solution of a problem or satisfaction of a want as the case may be. Take for instance, if it is your first time in Oyo state in South Western Nigeria and you are looking for a library to make some research in, your information need at that point is not the list of libraries in Nigeria, but the list of libraries in Oyo State and directions on how to get to the one closest to you. Likewise, not all information available in a society is useful to a person. A lot of information and information resources are available; some are good others are not. The library chooses those that it does not want in line with the functions and philosophy of the library. Within a library, it is the duty of the librarian to select those materials that will satisfy the interest of the users and leaves those that will not. Hence, this session has been tailored to intimate you with the concept of information need and discuss the need for information repackaging to suit the need of the individual user.

**Learning Outcomes for Study Session 2**

When you have studied this session, you should be able to:

2.1 Define and use correctly all the keywords printed in **bold** (SAQ 2.1)

2.2 Discuss the factors that accounts for information need. (SAQ 2.2)

2.3 Describe the concept of information repackaging and the methods of information repackaging (SAQ 2.3)

Keywords: information need, information repackaging, user analysis
2.1. Meaning of Information Need and the Associated Factors

2.1.1. Meaning of Information Need

Need is a basic concept in information studies but one which is difficult to define. Essentially, it implies a lack of something which if present would further our welfare or make easier the attainment of whatever objectives we may have in mind. The concept of need runs through the terms “want”, “desire”, “wish” and “requirement”. Our information needs of whatever kind are closely bound up with our cosmology of life. Those information needs that show close relationship to the solution of the matter at hand are considered relevant. For example, if you are looking for a formula to solve a mathematical problem or a recipe for preparing super for your family then mathematics and cookery books are of closer relevance than books on Economics and Biochemistry.

Thus, information needs of the clientele differ. For example, while a technologist needs information on new products, new manufacturing techniques, authoritative and unbiased information about the behaviour of new systems being marketed and likely data that certain process are expected to pass from development to production stage, a farmer on the other hand needs most practical information to solve specific problem at hand in respect of farming, the consumer may be only interested in knowing the price of commodities, the quality and contents of the commodity and its effect on the health of an individual. Information need could be defined as an individual or group’s desire to locate and obtain information to satisfy a conscious or unconscious need. Wilson T. O., (1991). Therefore, information needs of individuals in any society is influenced by the purpose and goal at hand. The more urgent the information need, the more desperate its search. Speed and accessibility of information are also factors that lead to effective information utilization. Information need of users may be categorized according to the purpose and perhaps the nature of the user. The purpose of information and its usefulness to the solution of a task at hand may lead to its demand and use.

Users of information do not gather such information for fun or without any genuine reason, most of the times, information are desired to assess others opinion about a concept and make valid judgement which can help in contributing to the body of knowledge. You can consider more of such factors as provided in box 2.1.
2.1.2. Factors responsible for Information Need

Box 2.1. Demand for and utilization of information is a product of the following factors as it will be discussed in this section:

1. Research
2. Nature of Job
3. Examination
4. Leisure/recreation
5. Problem solving
6. Education
7. Awareness

You can consider some of these factors as stated in the box 2.1

1. **Research:** This need or demand may be able as a result of research activity being undertaken by an information user. The research may be on security, politics, law, drug trade, librarianship and disease control. Research may be individually undertaken or corporately sponsored. The amount of information available to a research determines the success or failure of such endeavour (Atherton, 1999).

2. **Nature of Job:** The nature of a person’s job dictates the quality and volume of information he requires. Doctors solicit information from their patients to enable them diagnose their ailment, and proffer therapy. They also require information on drugs to determine their efficacy. The nature of job also enables a librarian to know and understand the characteristics of information users, so that he or she will be in a better position to provide the seeker with relevant information sources to satisfy his information need. The nature of a lawyer’s responsibilities make him seek information on details of the case he is handling, case file, client’s report and other matters that will enable him to prosecute a case effectively. Even in the performance of government functions, civil servants are meant to seek all kinds of information in their job performance. The government wants information on the population of the people and the demographic characteristics to enable it plan for every citizen. Tax assessors require relevant information on the age and occupation of people. An employer requires relevant information on the qualification of an applicant. Demand for and utilization of information is therefore a product of job performed by an individual or corporate organization (Alegbeleye, 1999).
3. **Examination:** Examination requirements can also lead to the demand and use of information whether at the primary, secondary or tertiary levels. Students who engage in one examination or the other such as JAMB, GCE, WAEC etc., require information pertaining to the time and venue of the examination, nature of invigilator, type of writing materials to be used (biro, pen, pencil, ruler). Because of this, students are frequent in the library for current news and to prepare for the examinations. The more informed a person is, the more prepared he is emotionally and psychologically: confidence during the examination is assured as a result.

**In-text Question**

- On your first day at work as a Librarian, you notice that hardly did any two persons come to the library to look for the same content. Why do you think the information needs of library users differ?
  - Information needs of users differ mainly because their reasons for seeking out the information differ. Information needs is influenced by the purpose and goal at hand. Read through section 2.1. to learn more on this.

Some other factors prompting information need by users as discussed as follows;

4. **Leisure/recreation:** The need to relax after the day’s activities makes people listen to radio and television, they listen to news and stories around the world, listen to advertisements on new products like drugs, foods, clothing and government activities. Information of this nature increases the awareness of people about their society and environment.

5. **Problem solving:** People face all kinds of problems in the society. These problems vary from one person to another. The problem may be on ill-health, unemployment, divorce, missing person, death etc. These problems generate tension and confusion in the person affected. To solve these problems for instance, on a missing person, the society requires information to locate his where-about. The police may want to know where the person hails from, his height, name, language and the last place he visited. Those suffering from ill-health will seek information on the best hospital for the treatment, type of drug to buy, etc., unemployed persons seek information on job opportunities in organizations and government establishments. The same applies to those who want to locate their friends after a long period of several communications. These conditions make the seeker demand for and use information to solve these problems (Uhegbu, 1997).
6. **Education:** Information helps people to understand the need for sound and qualitative education. This is because a well-informed person can take necessary decisions irrespective of his education. Parents who want their offspring to attend good schools seek information on the curriculum of the school, study facilities like classroom, tables and chairs, hostel accommodation facilities and feeding. Other areas of information need include quality of teaching and teachers, tuition fee and other financial aspects. These requirements increase the demand for and use of information.

7. **Awareness:** People demand information to keep abreast of developments in the academia through current journals, interaction with their colleagues during conferences and workshops, e-mail messages and networks. The fashion “craze” of Nigerian students in institutions of higher learning is as a result of their exposure to all sorts of information within and outside the country. Awareness of one’s environment demands that one has constant information.

*Given some of the factors responsible for information need, there is another concept to be discussed which is repackaging information to meet a user’s need. As the word repackaging implies, that simply means making the information available to the user with ease. You can read more in section 2.2.*

2.2. **Repackaging Information to meet a User’s Need**

**Information Repackaging** (IR) is the ability and method of making information available to groups of people in a particular format that could best be accessible to them, instead of the former format that was difficult for them to understand or access. For information to be beneficial to users, it may require interpretation and conversion to a form that end users can understand and assimilate. With information overload, librarians have long been involved in the repackaging of information for their clients and have accepted the idea that the real measurement and effectiveness of a library is not necessarily in the number of the books acquired, but the extent to which these materials have been put to use. Information and communication technologies are the driving tool for information repackaging in the 21st century. Examples of these include the internet-websites, portals and gateways, www, multi-media systems – TV, video etc. and storage media. Information professionals require skills to enable them repackage information and thereby function as middle persons between those who generate the information and those expected to use it. They need skills like computing skills, web authority skills, digitizing skills (conversion from print to electronic formats),
management skills, subject specialization, communication and human relations skills are also important.

Method of repackaging information refers to ways of adopting information to suit the desired information need of any user as depicted in Fig 2.1. There are many categories of users as well as their qualifications and responsibilities. Their language, location, education, age, sex also vary. Some are teachers, students, scientists, researchers, company executives etc. As there are varied, information users so also are varied information needs. Where the information appears in a language and written format alien to the prospective users, then the information should be repackaged in such a way as to meet the desired target needs of the users.

However, before adapting any information for any user within an information system - a library, a rural community, company, institution of learning, organization etc., the information specialist should first carry out a user analysis which will assist in ascertaining the basic education, language, profession or occupation, gender, location etc. The availability of these characteristics to the information specialist will determine the kind of repackaging required. User analysis therefore refers to the process of identifying the features of an information user to provide appropriate information need. User analysis can be done through oral interview method and questionnaire. The questionnaire should contain only those issues the information specialist would want the user to supply information about.

Repackaging information can be done in any of the ways presented in Fig 2.1.

1) Content repackaging
1) Medium repackaging
1) Time Schedule
1) User information interface

Fig 2.1. Ways of Repackaging Information

1. **Content repackaging**

This means to change the previous form of something. According to Onwubiko (1996), information repackaging is a grand design to the creation of a piece of information and disseminating same in more indigenous style recognizing the essentially community oriented nature of African country side. In information repackaging, deliberate efforts are made at locating and using the most
accessible and proximate channels such as the media or information as the main medium (Amadi, 1981). Content repackaging here would mean to reassemble the content of an information to the taste of a particular user or group of users. Information content can be statistically presented or put in such a way that the appropriate user or users may find it difficult to use. If a user is not good in statistics, it is the duty of the information specialist to present the information to him in the form he can easily understand. Records containing only statistics can be repackaged to include grammatical expressions to explain what they are. Information not in the form understandable to the user would appreciate the value of such information and at the same time meet his information need.

**In-text Question**

- “Food for Belle” is an NGO which seeks to increase Agricultural production in Nigeria. One of its methods of achieving this is through farmer’s education. The next community where they intend to visit is a village in Gboko, Benue state, Nigeria where majority of its citizens are illiterate farmers. They believe there is a need to repackage their information so that they can effectively reach out to the farmers. What is the first step to repackaging information and how can they go about this?
  
  ○ They must carry out a user analysis (refer to section 2.2 on the meaning of this).
  
  User analysis can be carried out by sending out questionnaires or one-on-one interview with the farmers.

You can examine some other ways of repackaging information as discussed here.

2. **Medium Repackaging**

Appropriate information can be properly used by the right user if the medium or source in which such information is presented is in harmony with the characteristics of that user. For instance, if a user is an illiterate farmer and as a result cannot read and write, any information on fertilizer application brought to him in written medium is useless. Since he can appreciate oral and visual aids, film shows, discussion groups on pest control should be organized to transmit such information to him. Diagrams can also be used if that can make any sense to him. The same thing applies to other disadvantaged users. Information means something to a user if it is communicated in a medium he can easily understand. Town criers, village meetings, extension workers of public libraries and government agencies should form the basis of repackaging information medium to the rural dwellers.
3. **Time Schedule**

This also determines the use of any information. Utilization of information is a function of time. Not all users can have time to come to a library or even ask colleagues for a piece of news. Many of them are always in a hurry. If for instance, an information professional wants to pass information on child immunization to people in the rural areas, and if the people are farmers and are usually available in the evening, the time for meeting them has to be rescheduled so that they can be met, otherwise going in the morning to talk to them is a waste of time because few people will be available.

4. **User information interface**

Here, utilization of information can be made a great deal easier if the user and the information are brought into close proximity. In other words, information should be given to a user at the place close to his/her location. For instance, if a user is located in the rural area, it will be meaningless to expect him to go to the urban area for information on his agricultural needs. To adapt information to his need, information must be given to him in the place where he resides. It is on record that information is often taken for granted resulting in its non-recognition in human development (Sturges and Nell, 1990). User information interface is a packaging strategy in which information and the user are brought into close contact within the precincts of a user’s abode.

---

**Activity 2.1.**

*Time Allowed: 20minutes*

As an expert in Information Science, provided you have been consulted on the ways in which information can be repackaged to meet user’s need, make a short note of not less than 500 words on some of the available ways and identify why such ways can be useful in information repackaging.

**Activity 2.1. Feedback**

You need to write on content repackaging, medium repackaging, time schedule, and user information interface.

**Summary for Session 2**

*In this session, you have learned that;*
1. Information needs of individuals in any society differ from person to person or from situation to situation as is influenced by the purpose and goal at hand.

2. Factors that could lead to information need includes: research, nature of job, examination, leisure, problem solving, education and level of awareness.

3. Information repackaging is the process of making information available to groups of people in a particular format that could best be accessible to them.

4. Before adapting any information for any user within an information, the information specialist should first of all carry out a user analysis.

5. User analysis is the process of identifying the features of an information user in order to provide appropriate information need.

6. Information repackaging can be done by content repackaging, medium repackaging, adjusting time schedule or by user information interface.

7. Self-Assessment Questions for Study Session 2

Now that you have completed this study session, you can assess how well you have achieved its Learning Outcomes by answering the questions below. You can check your answers with the Notes on the Self-Assessment Questions at the end of this material.

SAQ 2.1 (tests Learning Outcome 2.1)
Write short notes on the following:
(a) Information need (b) Information repackaging (c) User analysis

SAQ 2.2 (tests Learning Outcome 2.2)
Barrister Nsogbuwa, a very young lawyer, has a case in court where he will be appearing against an erudite Senior Advocate of Nigeria (SAN). In preparation for the case, he has spent most of his time in the last three days in the Law Library reading up every decided case on the subject matter. Identify the factor that is driving Barrister Nsogbuwa’s need for information. Highlight other factors that could create information needs.

SAQ 2.3 (tests Learning Outcome 2.3)
“Food for Belle” is an NGO which seeks to increase agricultural production in Nigeria. One of its methods of achieving this is through farmer education. The next community where they intend to visit is a village in Gboko, Benue state, Nigeria where majority of its citizens are illiterate farmers.
They believe there is a need to repackage their information so that the can effectively reach out to the farmers. Give them hints on how they can repackage their information so that it will be beneficial to the local farmers.

References


en-wikipedia.org/information.needs.
Study Session 3: Information System and Its Components

Introduction
This study session will be discussing information system and its components. It is essential for you to know that business firms and other organizations rely on information systems to carry out and manage their operations, interact with their customers and suppliers and compete in the market place. For instance, corporations use information systems to reach their potential customers with targeted messages over the web to process financial accounts and to manage their human resources. Governments deploy information systems to provide services cost-effectively to citizens. Digital goods, such as electronic books and software, and online services, such as auction and social networking are delivered with information systems. Individuals rely on information systems, generally internet based, for conducting much of their personal lives, for socializing, studying, shopping, banking and entertainment.

As major new technologies for recording and processing information have been invented over the millennia, now capabilities have appeared e.g. invention of printing press and calculator. These inventions lead to a profound revolution in the ability to record, process, and disseminate information and knowledge. The progress of electronic commerce over the internet has resulted in a dramatic growth in digital interpersonal communications through (e-mail and social networks), distribution of products (software, music, e-book and movies) and business transactions, (buying, selling, and advertising on the web) with the emergence of smartphones, tablets and other computer based mobile devices. So, in this study session, you will find out the meaning of this information system and discover its components.
Learning Outcomes for Study Session 3

When you have studied this session, you should be able to:

3.1 Define and use correctly all the keywords printed in bold (SAQ 3.1)
3.2 Identify the components that make up information system (SAQ 3.2)

Keyword: information system

3.1. Meaning and Components of Information System

3.1.1. Meaning of Information system

*Information system* is an integrated set of components for collecting, storing and processing data and for delivering information, knowledge and digital products. Information system is a combination of hardware, software, infrastructure and trained personnel organized to facilitate planning, control, coordination and decision making in an organization. It is the collection of technical and human resources that provide the storage, computing, distribution, and communication for the information required by all or some part of an enterprise. A system is always a combination of people, machines, processes and technology; therefore, designing a system takes much more than technology as people and processes are also involved. Information system in essence bridges the gap between business and the ever-growing field of computers. Information system have enabled more diverse human activities, they have exerted a profound influence over society. These systems have quickened the pace of daily activities, affected the structure and mix of organizations, changed the type of products bought and influence the nature of work.

**In-text Question**

- With the advent of information technology, we use information systems in virtually every transaction we make on the internet. Identify five examples of information systems that you use
  - Air ticket booking system to generate and track airline tickets and payments;
  - Customer relationship management systems to track customer services. (You can now think of the remaining three information systems that you know)

*Having discuss what information system entails, let us examine the components of information system.*
3.1.2. Components of Information System

The five components that must come together to produce a computer-based information system are presented in fig 3.1.

![Diagram showing the components of Information System]

You can examine these five components as displayed in Fig 3.1.

1. **Hardware**: The term, hardware refers to machinery. This category includes the computer itself, which is often referred to as the central processing unit (CPU) and all of its support equipment. Among which are: input and output devices, storage devices and communication devices.

2. **Software**: This refers to computer programs and the manuals (if any) that support them. Computer programs are machine readable instructions that direct the circuit within the hardware parts of CBIS to function in ways that produce useful information from data. Programs are generally stored on some input/output medium, often a disk or tape. There are two types of software: System software and Application software.
The system software manages the hardware, data and program file and other system resources and provide means for the user to control the computer, while the application software are programs designed to handle specific tasks for users.

3. **Data:** These are facts that are used by programs to produce useful information like programs, data are generally stored in machine-readable form on disk or tape until the computer need them.

4. **Procedures:** These are the policies that govern the operation of a computer system: “procedures are to people what software is to hardware” is a common analogy that is used to illustrate the role of procedures in a Computer Based Information System (CBIS).

5. **People:** Every computer-based information system (CBIS) needs people if it is to be useful. Often the most over-looked element of the CBIS are the people, probably the component that most influences the success or failure of information systems.

**Summary for Session 3**

**In this session, you have learned that:**

1. Government, business organisations and individuals rely on information systems to improve their processes and services, increase business and generally improve the quality of living.

2. Information system is the collection of technical and human resources that provide the storage, computing, distribution, and communication for information required.

3. The components of information system are; hardware, software, data, procedure and trained personnel.

**Self-Assessment Questions for Study Session 3**

Now that you have completed this study session, you can assess how well you have achieved its Learning Outcomes by answering the questions below. You can check your answers with the Notes on the Self-Assessment Questions at the end of this material.

**SAQ 3.1 (tests Learning Outcome 3.1)**

Explain Information System and state its advantages?

**SAQ 3.2 (tests Learning Outcome 3.2)**

Based on what you have learnt in this session, outline the components of an information system?
References
www.businessdictionary.com/definition
www.techopedia.com/definition
http://wikianswers.com/Q/what are the Components of Information System.
Study Session 4: Channels of Information in Science and Technology

Expected Duration: 1 week or 2 contact hours

Introduction
Recall that in study session 1, we defined information as data which is transmitted from one person to another through a medium (channel) which enables the recipient dispel ignorance and make rational decisions. Communicating information from one location to another requires some form of pathway or medium. This is what is referred to as the channel of communication. In this session, your attention will be directed to the information channels used to transmit information between data processing terminals separated by large distance through transmissible signals in the field of Science and Technology.

Learning Outcomes for Study Session 4
When you have studied this session, you should be able to:
4.1 Explain the Shannon-weaver model stages of communication (SAQ 4.1)
4.2 Discuss the channels of information in science and technology (SAQ 4.2)

Information Channels for Scientists and Technologists
Information could be seen as a class of events. It is the alteration of the image which occurs when it receives a message. Thus, it is an event; one which occurs at some unique point in time and in space, to serve a particular purpose in its social value, information is a source of change, which conjures in the mind of the recipient a completely new opinion in what hitherto he was unaware of, it enables the recipient to aggregate various situations into a coherent whole for sound decision (Prat, 1997). The transmission of knowledge depends on the movement of information in order to be realized. To enable information move from the information source to the user, it is necessary to go through certain transmission channels. Communication of information is the activity or process of imparting
information to other people or other living things using signals such as speech, body movements or radio waves.

The Shannon-Weaver model in Figure 4.1, represents communication as a linear flow process. This obviously is only a partial reflection of how communication works. It does not include feedback.

\[ \text{Fig 4.1 The Shannon-Weaver Model of Communication} \]

As you proceed in this lecture, you also need to examine communication and growth of information where you will get to learn about some of the channels of information.

. Communication and Growth of Information

Just because information is provided through a channel does not mean that it will necessarily be absorbed by recipients. Many channels transmit so much information that is impossible for any individual to sift through it all. Many information users prefer a convenient channel providing lower quality information system depending on a micro-electric based combination of computing and telecommunication technology. Information technology is the electronic way of collecting, storing, processing and disseminating textual, numerical, pictorial and vocal Information (Feather and Sturges, 1997). These channels include:

1. People

The first obvious but very important way of spreading information is by word of mouth. People talk to friends and colleagues, passing on news about their own work which often includes pieces of information they have read elsewhere or by face-to-face interview. Communication is even a common place throughout the animal kingdom.

2. Community Information

The information relates to any topic that affects the life of the community, for example; social, domestic, health or educational facilities, details of cultural activities, clubs and societies and the range of local authority or government services. Also, information for groups of people with common experience seeking improvements in their circumstances, and information enabling all to
participate in local and national democracy. In public libraries, the primary focus is on provision of community information for people who otherwise may experience difficulties in gaining access to the help they need.

3. **Journals**
A journal is a periodic publication, particularly one issued by a society or institution and containing proceedings, transactions, reports, substantial articles and reviews of publications in a particular scholars or scientific field. Journals are publications that carry first reports of scholarly research and theoretical discussions. They also include reviews of current books, abstracts or comments on materials in current periodical literature reviews of special areas. Examples are: The Royal Society of Chemistry, The Institute of Mechanical Engineers, Journals of Physics (Institute of Physics and Physical society), Journals of Applied Chemistry and Biotechnology (society of chemical industry). Journals constitute sources of information to scientists worldwide (Olabisi, 2002).

4. **Thesis/Dissertation**
A thesis is a long piece of writing, based on your own ideas and research that you carry out as part of a university degree. Thesis is sometimes called dissertation which are usually produced in partial fulfilment of the requirement for higher degrees such as Doctor of Philosophy (Ph.D). Thesis are researched and written under the supervision of a member of the academic staff of the degree awarding institution and before acceptance, they are referred by an external examiner who is a recognized authority in the subject field of the thesis. For example, Ph.D. thesis, University of Ibadan, Nigeria.

5. **Conference proceedings**
This could be referred to as the research papers presented at a conference, meetings, symposia, seminars, workshops, which are later publishing as proceedings, sometimes in the form of a book. Conference proceedings can be a useful way of finding out about projects still in progress which have not been written up in complete form as paper in journals. Conference tends to focus on expanding subject field of themes which are becoming increasingly important, so the published proceeding often reflects the future direction of a specialty.

6. **Reports**
Reports are official documents which are prepared by a committee or other group of people who have been working on a particular subject at conferences. It is otherwise a written or spoken account
of something that has happened. Some reports are available to anyone interested. But some others are restricted to a limited number of people. Examples of research reports in science and technology are:


7. Patent

Patents have proven to be an immensely valuable information source for invention/technology, business and legal actions. It is a specification concerning the designs or manufacture of something which is protected by letters. Patents are secured for the exclusive profit of the designer or inventor for a limited number of years which varies in different countries from fifteen to twenty years. The Department which controls the registration of patents is called a “Patent Office” (Harold, 1990).

8. Trade Literature

Industrial and commercial companies produce trade literature. Trade literature is a material prepared with varying degree of technical specifications by companies that are manufacturers of parts that describe their products or services to potential consumers and which encompasses product literature. It aims at illustrating and describing equipment or goods relating to the manufacturers. They are issued by the manufacturers or dealers and are often well produced. Trade literature may take the form of a technical bulletin, price list, data sheet etc. United Kingdom (UK) is one of the largest producers of trade literature. A few examples of Trade Literature are:


In-text Question

- Thomas Edison is considered to be America’s most prolific inventor, creating the phonograph, the electric light bulb, motion picture camera, amongst other inventions. Where
you want to understand the designs of any of his models which of these channels of information will best give you the information you seek? (a) Journal  (b) Reports (c) Patent (d) trade literature

  o  The answer will be (c) Patent. You can revisit item 7 of this section to learn more about patent.

Some other channels that we have are discussed as follows;

9.  **Standards**
Standards are rules for quality, size or shape of industrial products. These helps in simplifying the product’s distribution by a manufacturer and eliminating the non-standardized items from the market. These are usually drawn up by organized agencies, governments or quasi-governments like British Standard Institute (BSI) in Britain, Bureau of Standards in USA, Bureau of Indian Standard (BIS) in India and the Standards Organisation of Nigeria (SON).

10.  **Reviews**
Harold (1990) opined that review is an evaluation of a literary work published in a periodical or newspaper. Reviews give adequate coverage and full bibliographic details. It can be found in all sorts of publication. For example, Annual Review of Information Science and Technology by American Information Science, Washington D.C (1976).

<table>
<thead>
<tr>
<th>Activity 4.1.</th>
<th>Time Allowed:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Considering the channels of information discussed here, identify at least 6 of these channels with a brief description of how they pass information to the users.</td>
<td></td>
</tr>
</tbody>
</table>

**Activity 4.1. Feedback**
Some of the information channels are; patents, reports, conference proceedings, journals, reviews etc.
Summary of Session 4

In this session, you have learned that;

1. Communication of information is the activity or process of imparting information to other people or other living things.
2. Communicating information from one location to another or from one person to another requires some form of channel.
3. The Shannon-Weaver model transmission model represents communication of information in this process: information source, transmitter, channel, receiver and destination.
4. The channels of Information in the field of science and technology are; people, journals, community, thesis and dissertation, conference proceedings, reports, patent, trade literature, standards and reviews.

Self-Assessment Questions for Study Session 4

Now that you have completed this study session, you can assess how well you have achieved its Learning Outcomes by answering the questions below. You can check your answers with the Notes on the Self-Assessment Questions at the end of this material.

SAQ 4.1 (tests Learning Outcome 4.2)
Illustrate diagrammatically the Shannon-weaver model of communication.

SAQ 4.2 (tests Learning Outcome 4.3)
Channels of Information in Science and Technology are many, mention ten and discuss eight of them.
References


Study Session 5: Sources of Information in Science and Technology

Introductioin
You are welcome to LIS 315 study session 5 which has been designed to acquaint you with some of the information sources used in Science and Technology. As information is sourced in other fields of study, Scientists and Technologists also generate information on a daily basis as they go about their work. When searching for information on a topic, it is important to understand where it would be most appropriate to find what you are looking for. Thus, to make work easier and less laborious, they have been divided into primary, secondary and tertiary sources. The primary sources of scientific–technical information are the first published records of original research and development while the secondary is the filtration of primary sources and the tertiary sources are the compilation of both the primary and the secondary sources. Students should be involved in giving different definitions in their own expression. In addition to that, this session also discusses the concept of periodicals as an important primary source of Information in science and Technology.

Learning Outcomes for Study Session 5
When you have studied this session, you should be able to:
5.1 Define and use correctly all the keywords printed in **bold** (SAQ 5.1 and 5.2)
5.2 Identify the sources of information in science and technology (SAQ 5.1 and 5.2)
5.3 Discuss the importance of periodicals to researchers in science and technology (SAQ 5.3)
Keywords: primary sources, secondary sources, tertiary sources
Sources of Information in Science and Technology

Many years ago, the number of scientists was limited and information could not be disseminated without large-scale organization. Personal individual endeavour was supplemented by organizing conferences, publication of proceedings (by learned societies and by professional institutions) and by the establishment of large libraries. In this way, a network of institutions and services grew, encompassing primary publications reporting original work, secondary publications like abstract, journals, indexes etc. At present, however, a multitude of sources of information in science and technology are found. The whole literature of Science and Technology is divided into three categories: primary, secondary and tertiary as presented in fig 5.1.

Fig 5.1. Sources of Information to Scientists and Technologists

Primary sources:
1) Research/Technical reports
1) Thesis/dissertations
1) Periodicals
1) Conferences proceedings
1) Patent
1) Standard
1) Trade literature

Secondary sources:
1) Encyclopaedias
1) Dictionaries
1) Handbooks
1) Directory
1) Monographs
1) Indexing and abstracting services
1) Bibliographies

Tertiary sources:
Dictionaries
Bibliographies
Yearbooks
Handbooks
Almanacs
Gazetters
Guides
Manuals

Primary sources
As seen in fig 5.1., the primary sources of information are the original sources of information which have not been interpreted or condensed by other workers or compilers. It allows researchers to get as close as possible to original ideas, events, and empirical research as possible. Primary sources record information not yet tested or proven, it is widely scattered, disconnected and unorganized.
Nevertheless, these sources are used to meet the special reference search of users. Examples of primary sources of information include:

1. Research/Technical reports
2. Thesis/dissertations
3. Periodicals
4. Conferences proceedings
5. Patent
6. Standard
7. Trade literature

**Secondary sources**

The secondary sources on the other hand can be described as organized works and compilations derived from primary source literature make up the secondary source of science and technology information. It analyses, reviews, or summarizes information in primary resources or other secondary resources. Secondary sources are organized in a more usable and convenient form. They represent “worked-over” knowledge rather than new knowledge. They not only serve as repositories of digested facts, but also act as bibliographical keys to the primary sources. Examples are:

1. Encyclopaedias
2. Dictionaries
3. Hand books
4. Directories
5. Monographs
6. Indexing and abstracting services
7. Review of progress
8. Bibliographies

**In-text Question**

- Nerd always had an ambition to create a time machine since he was seven years old. His mother encouraged him to write all his research down in a book which he has titled “Diary of a Time Machine Maker”. He is now 22 and has succeeded in building a time machine. Other scientists want to study his work and they have made reference to the book “Diary of a Time Machine Maker”. What source of information does this book fall under?
  - The book “Diary of a Time Machine Maker” is a primary source of information. See section 5.1.1 for more information.
Before you leave this section, the third sources of information you need to examine as presented in fig 5.1 is the tertiary sources.

**Tertiary sources**

Another means by which scientists and technology gets their information is through the tertiary sources. These are information sources which have been produced after the distillation and filtration of primary and secondary sources. Most of the tertiary sources do not carry subject knowledge at all. Reference sources used in the library fall under this category. Tertiary sources include:

1. Dictionaries
2. Encyclopaedias
3. Bibliographies
4. Yearbooks
5. Handbooks
6. Almanacs
7. Gazetteers
8. Guides
9. Manuals

**Box 5.1 Differences between Primary, Secondary and Tertiary sources of Information**

While these definitions are clear, the lines begin to blur in the different discipline areas. The distinctions between primary, secondary, and tertiary sources can be ambiguous. An individual document may be a primary source in one context and a secondary source in another. Encyclopaedias are typically considered tertiary sources, but a study of how encyclopaedias have changed on the Internet would use them as primary sources. Time is also a defining element.

You have come another phase of this session where periodicals (a source of primary information) will be discussed in details based on its relevancy and consistency for researchers in the field of Science and Technology.

**Periodicals**

Periodicals make up the bulk of primary sources literature of science and technology. They are journals, newspapers or other publications published at regular or irregular intervals and intended to
Publication of Periodicals
Periodicals may be published by:

a) Learned societies e.g. Universities and Research Associations. For example; journal of chemical society, journal of Physical Chemistry (American Chemistry Society) etc. The main purpose of such periodicals is to furnish an opportunity for authors to publish the results of their investigations.

b) Professional Bodies: such as the Agricultural Society of Nigeria; Royal Society of Chemistry and Institution of Mechanical Engineers. The Nigerian Engineers Newsletter (Quarterly) by the Nigerian Society of Engineers, Lagos.

c) Commercial publishers: Majority of periodicals in science and technology are produced as business ventures by commercial publishing houses. Since they must make a profit to survive, the titles are heavily concentrated at the applied industries and commercial, technical trade.

In conclusion, periodicals present a range of problems to the library manager. New titles are constantly being published, current titles change or split into several parts, unannounced supplements appear and prices spiral at an alarming rate. Such constant momentum and change also means that they are very difficult to control bibliographically, posing problems for librarians and end users alike.

Summary of Study Session 5
In this session, you have learned that:

1. Information in science and Technology can be gotten from three major sources; primary, secondary and tertiary sources
2. Primary sources of information are the original sources of information which allows researchers to get as close as possible to original ideas, events, and empirical research.
3. Secondary sources analyses, reviews, or summarizes information in primary resources or other secondary resources.
4. Tertiary sources consist of primary and secondary source information which has been collected and distilled.
5. Periodicals are an important primary source of information in science and technology. It includes journals, newspapers or other publications published at regular or irregular intervals and intended to continued indefinitely.
6. Periodicals may be published by learned societies, professional bodies or commercial publishers.

Self-Assessment Questions for Study Session 5
Now that you have completed this study session, you can assess how well you have achieved its Learning Outcomes by answering the questions below. You can check your answers with the Notes on the Self-Assessment Questions at the end of this material.

**SAQ 5.1 (tests Learning Outcome 5.1 and 5.2)**
Using the knowledge gained in this lecture, identify three sources of information in science and technology and give five examples of each of them.

**SAQ 5.2 (tests Learning Outcome 5.1 and 5.2)**
Primary sources of information are considered to be the most original source of information in science and technology. However, it may not always meet the need of the researcher. Highlight at least three disadvantages of primary sources of information.

**SAQ 5.3 (tests Learning Outcome 5.3)**
As an expert in the field of Library and Archival studies, how will you describe a periodical and what are three (3) likely problems periodicals might pose to the library manager?

References
Study Session 6: Reference Sources in Science and Technology

(Intro)

Expected Duration: 1 week or 2 contact hours

Introduction

One of the important functions of a library is the use of its resources such as reference and information sources to provide information to users on request. The request could range from the specific to general information. Reference sources are documents that contain miscellaneous information on any topic – be it an event or individual. These reference and information sources are not meant to be read from cover to cover. Rather, they are expected to be consulted as and when necessary to supply information desired by a user of the library. For example, if you are reading a book on the history of Nigeria and in the book, reference is being made to some cities and towns which you know nothing about. To get a clearer picture, you could refer to a map or atlas as the case may be as a reference. Because of the importance of these reference sources, they are usually separated from the regular non-fiction books in the history. Reference sources can appear both in printed and electronic forms. They are specially compiled to provide answers to any type of queries that might be raised by the user of a library. It only contains facts and rarely does a reference source contain opinions. It is generally based on universally accepted knowledge. To ease your study, this topic will be divided into two; general and main reference sources in science and technology which will be discussed in this study session and in study session 7 respectively.

Learning Outcomes for Study Session 6

When you have studied this session, you should be able to:

6.1 Define and use correctly all the keywords printed in bold (SAQ 6.1)

6.2 Identify the general reference materials in the library on science and technology and explain their uses.

Keywords: map, atlas, gazetteer, travel guide, globe, plan, chart, government publication.
General Reference Sources in Science and Technology

Reference sources are books such as atlases, bibliographies, dictionaries, directories, etc. which are compiled to supply definite pieces of information of varying extent and intended to be referred to rather than read through. They are books which are kept at the reference section of a library for reference only. They are not allowed to be checked out of the library (Olabisi, 2002). These reference materials unlike the textbooks are unsuitable for wholesome reading. One can only consult a section of a reference material to find needed information because reading through the whole documents or publications will serve no useful purpose. Some of the general reference sources will be discussed as follows:

Maps

They come out in the form of pictorial material. They are graphical representations of geological, physical and natural features, normally to a scale and on a flat medium. It can appear in various forms. It can be folded like the road maps of a city. Generally, maps are made up of texts and pictures. Simply put, maps are geographical location of places. An example is shown in Figure 6.1

![Figure 6.1 Map of Nigeria](http://bit.ly/2grU3jL)
**Atlases**

An atlas is a collection of maps and related information bound together. They provide information on physical and climatic conditions of different places such as towns, countries and regions e.g. The Times Atlas of the world. Atlas may be issued to supplement or accompany a text or it may be published independently.

**In-text Question**

- Based on what you have learnt in this session so far, do you think there exists any difference between a map and an atlas?
  - While a map is a graphical representation of geological, physical and natural features; an atlas is a collection of such maps.

*You can consider some other reference materials as discussed here*

**Gazetteers**

They usually provide information on towns, cities and other geographical features. These are more or less a dictionary of geographical places such as cities, towns or countries. They usually provide information on latitude, longitude, description and statistics about places e.g.


**Travel guide**

This provides information to a traveller about places of interest and features of a particular place the traveller wishes to visit. Thus, information on transportation, hotels, restaurants etc. is usually provided.

**Globe**

A globe is an object on which a map of the earth surface or sky is painted and which may be turned round on a base. It is a model of the earth or any celestial body depicted on the surface of a sphere as shown in Figure 6.2
Plan

A plan is a drawing of a building or an area showing the relative positions of structures and facilities on a horizontal plane. Thus, the shape, measurements, position of the walls and other locations can be graphically represented. An example is seen in Figure 6.3 below.
Chart
A chart is information written or drawn on a plain sheet of paper.

Government publications
This is also regarded as reference sources because some of the information required by users can be supplied by government publications. These are publications issued by branches and organs of government including judicial and legislative bodies. Also, publications of regional and international organization are regarded as government publications. The information contained in these publications may never be found in other information sources.

Summary for Session 6
In this session, you have learned that;
1. Reference sources are materials which are compiled to supply definite pieces of information and intended to be referred to rather than read through.
2. They are books which are kept at the reference section of a library for reference only as they as reading through the whole documents or publications will serve no useful purpose.
3. Reference sources in science and technology are divided into general and main sources.
4. General reference sources include: maps, atlases, gazetteers, travel guides, globe, plan, charts and government publications.

Self-Assessment Questions for Study Session 6
Now that you have completed this study session, you can assess how well you have achieved its Learning Outcomes by answering the questions below. You can check your answers with the Notes on the Self-Assessment Questions at the end of this material.

SAQ 6.1 (tests Learning Outcomes 6.1 and 6.2)
*From the provided options, choose the one that fits into the available blanks*
1. If you are in a city for the first time and you need information on how to drive around, _______ would give you the best information (a) Gazetteer (b) travel guide (c) city plan (d) atlas
2. In a ________you will find the longitude and latitude of the county, state, city town where you live (a) Chart (b) Globe (c)Gazetteer (d) Atlas
3. _______ is a collection of maps (a) Atlas (b) Town plan (c) Gazetteer (d) Chart
4. ________ is a map that will most likely be found in a spherical form (a) Atlas (b) Globe (c) Pie chart (d) None of the above

5. Kayode is planning to take his wife to an exotic location for a second honeymoon. He is looking for a travel destination that will fit his budget. ________ resource will be best helpful to him (a) Town plan (b) Globe (c) Map of the world (d) Travel guide

References


Study Session 7: Reference Sources in Science and Technology
(II)

Expected Duration: 1 week or 3 hours

Introduction
Recall, it was stated in session 6 that this topic will be divided into general and main reference sources in Science and Technology, where you learnt about the general reference sources namely: maps, atlases, gazetteers, travel guides, globe, plan, charts and government publications in the last session. You learnt that these reference sources can only be referred to rather than read through and cannot be checked out of the library like other text books. They are supplementary materials which are read along with other texts for clearer understanding. This study session will enable you to also have an idea of what is meant by main reference sources such as encyclopaedias, dictionaries, directories, almanacs and handbooks. It will also enlighten you on the significance of these resources to scientists and technologists.

Learning Outcomes for Study Session 7
When you have studied this session, you should be able to:

7.1 Define and use correctly all the keywords printed in bold (SAQ 7.1 and 7.2)
7.2 Identify the main reference materials in the library on science and technology and explain their uses. (SAQ 7.1, 7.2 and 7.3)

Keywords: encyclopaedia, dictionary, directory, almanac, handbook.

7.1 Main reference sources
The main reference sources of information and science and technology which will be discussed here are encyclopaedia, dictionary, directory, almanac and handbook.

Encyclopaedia
These are reference sources that are devoted mainly to providing information and facts on a variety of topics. They provide background information on any topic as well as current information. The
articles are usually written by experts in the field and the topics are arranged alphabetically. At the end of each article a list of references pertaining to the topic is provided. The list of references is perhaps the most useful to a researcher who is interested in the topic being considered. An encyclopaedia could be general e.g. Encyclopaedia Britannia or a subject encyclopaedia e.g. Encyclopaedia of science.

In the former, the encyclopaedia covers all kinds of topics while in the latter, it is restricted to topics on the specific subject. It could be categorized according to discipline or the type of audience it addresses, Encyclopaedia may be in one volume or in many volumes. Some encyclopaedias in science and technology are:


Evaluation of Encyclopaedias

Encyclopaedias are very expensive, so, they must be evaluated before a library acquires them. Encyclopaedias can be evaluated following these indices.

- a. Scope: The librarian can peruse the encyclopaedia to ensure that the content reflects the scope as stated by the publisher.
- b. Authority: The authority of the encyclopaedia is essential. This can be gauged based on the compilers and the publishers of the encyclopaedia. The contributors to the encyclopaedia must be experts who are in a position to provide up to date, accurate and unbiased information.
- c. Writing style: The writing style should be comprehensible to readers.
- d. Revision: The encyclopaedia must be regularly revised. This would be effected through the publication of supplements annually. These supplements provide a summary of the major events that happened in the previous year.
- e. Arrangement: The arrangement should be logical and easily understood. This is why the arrangement should be alphabetical.
- f. Format: The encyclopaedia should be well-illustrated.
- g. Cost: A good encyclopaedia should be affordable and not too expensive.
**In-text Question**

- Bill works in the Collection Development section of the library. He was given the task to acquire an encyclopaedia for the library. Advise him on the prerequisites he must look out for before purchasing the encyclopaedia.
  - The things that Bill must look out for are: the scope of the encyclopaedia, the calibre of its authorities, the writing style employed. You can find other indices in section 7.1.1,

Another main reference source which is known to be relevant in science and technology is the dictionaries. You may be wondering is it the same popular dictionary used in English, it shares the same principles with it but this is more of a specialized dictionary mainly for science and technology terms. You can see details in section 7.1.2.

**Dictionaries**

Dictionaries list words of a language or a subject arranged in alphabetical order with each word, meaning, spelling, derivations, pronunciation etc. In science and technology, the purpose of a dictionary is to define commonly used terms in the simplest manner. There are general dictionaries and specialized dictionaries. Some examples of dictionaries in science and technology are:


Dictionaries are of three main categories: monolingual dictionaries, bi-lingual dictionaries and acronym (abbreviation) dictionaries.

**Directories**

A directory is a book which gives the list of names and addresses with other information added; of people, organizations or business houses, institutions including their telephone numbers and e-mail addresses, usually arranged in alphabetical order. In addition, a directory is an alphabetical or classified list containing the names and addresses of the inhabitants of a town or region/state. For example, members of trade profession of societies or institutions. Examples of scientific directories are: Harvey, A. P. Directory of Scientific Directories (Hodyson 2nd ed. 1972).
Categories of Directories

Directories can be categorized into three major groups:

a. Trade or Industrial Directories: This is primarily an instrument of commerce with its main aim of bringing together buyer and seller. Majority of directories fall into this category. Examples are: Industrial Mineral Directory edited by D. corps. (2nd Edn, New York, Metal Bulletin Books (1982) and Croner’s Trade Directories of the World (New York, Croner publications) provides a world-wide listing with loose-leaf monthly supplements.

b. Institutional Directories: Most scientific institutional directories have a world-wide coverage in scope. Prominent among them are: The National Academy of Science, Scientific and Technical Related societies of the U.S (Washington D.C 9th edn. 1971). The world of learning published annually by European publications and arranged country by country. For each of over 250 countries listed, it gives the list of societies, professional associations, research institutions, libraries, museums, universities, polytechnics and colleges, including a combined organized index. Others are Directory of on-going Related Scientific Research Areas in Nigeria (Federal Institute of Industrial Research, Oshodi (FIIRO), Lagos, Information Division 1980 and Directory of computerized Information in Science and Technology (New York, Science Association International).

c. Individual Directories: This directory gives information about each scientist in the field of science and technology. Typically, a society's list of members will contain information such as full names, addresses, telephone numbers, qualifications and status of members with the society (fellow, members, associate), and the date he or she was elected. For example, the Mineralogical Society list of members, the Association of Engineering, Geology Directory, the Directory of official, Architects and planners, the Directory of Official Architects and planners, the American Chemical Directories of Membership with over 100,000 names and the Directory of Technical and Scientific Directories (5th edn. Longman 1988) etc. The most frequently encountered of such lists, however are the membership directories of the scientific and technical societies and institutions e.g. the annual Institution of Mechanical Engineers list of members.

Other types of Directories

a. Educational/Research Directories: This is a list of all the educational institutions, their location, e-mail address and telephone numbers. To compile an educational directory, the
librarian will send a request for them to send the appropriate details but not compulsory for them to respond.

b. Library Directories: This is a list of all libraries and addresses within a particular nation, state or globally. It is a list of all library types (private, public, special, academic) in a particular state, nation or worldwide e.g. American Library Directory, World Guide Library (Gives a list of reputable libraries world-wide).

c. Foundation and Grant Directories: They contain donor bodies for grants and scholarship (grants for research or scholarship). They give lists of granting bodies which can be accessed through their e-mail address, telephone numbers, facsimile etc. Some companies also have foundations where one can undergo training or earn grants for research e.g. MacArthur Foundation.

d. The Publishing and Book Trade Directory: This is a list of publishing firms & Book trade companies in a country, their telephone numbers, names, e-mail address, contact numbers etc. for example Nigerian publishers Association Directory.

e. Business Directory: A list of companies that are involved in different businesses compiled together in alphabetical order.

f. Telephone and fax directories: All telephone numbers and addresses of companies compiled together.


g. Government directories: It gives information, names, contact address of government agencies and institutions.

h. Association directories: it gives the list of all association with their contact address.

i. Year Book: A year book contains current information or events of a particular year. It is published every year. Harrod (1990) says a year book is a volume often called an annual, containing current information of a valuable nature, a brief description and/or statistical form, which is published once every year. For example, McGraw-Hill year book of science and technology (Annual, McGraw-Hill gives an account of the major yearly development in the field of science which updates their respective encyclopaedia, most yearbooks are designed to be as concise as possible and to concentrate on the factual. Other general yearbooks include the Sugar yearbook and Mineral Yearbook. They give information such as statistics of production, consumption, imports, exports, stocks etc.
Box 7.1. Categories of Directories

Directories can be categorized into three major groups:

- Trade or Industrial Directories: This is primarily an instrument of commerce with its main aim of bringing together buyer and seller.
- Institutional Directories: Most scientific institutional directories have a world-wide coverage in scope.
- Individual Directories: This directory gives information about each scientist in the field of science and technology.

Activity 7.1.  

Time Allowed: 10mins

Take a good look at some of the main reference sources that has been discussed in this session, after doing this, you are advised to close your course material and make a brief description of at least 4 of these sources.

Activity 7.1. Feedback

With your course material closed, you are expected to describe encyclopaedias, dictionaries, almanacs, directories etc.

Some other main reference sources in science and technology as will be discussed are the Almanacs and Handbooks.

Almanacs

Encyclopaedia Americana (1997) defines Almanac as a book or table containing calendar of days, weeks or month. Almanacs are publications containing collections of useful and interesting facts or statistics, usually in the form of tables and often, covering the period of a year. For example, the World Almanac is better on American aspects, though, its scope is worldwide. It is especially good for U.S national and local politics, statistics and for chronologies including disasters, storms, volcanic eruptions, kidnappings, oil spills and assassinations. They often contain out of the way facts which no other reference book bothers to collect, for example, the Bowker Annual Library and Book Trade Almanac. The two types worth of special mention very similar in approach, which should be found side-by-side in any reference collection are: Whitaker’s Almanac, London (1868) and The World Almanac and book of facts, New York; Pharos 1868.
Handbooks
A handbook is capable of being conveniently carried as a ready reference book covering a particular subject field of knowledge. It contains concise information and small enough to be held in the hand, but secretly a book written primarily for practitioners and serving for constant revision of references (Harrod 1990). It can also be defined as a book that gives advice and instructions about a particular subject tool, machine etc. handbooks are often produced by a particular organization or by the company who produce tools, machines etc. Continually, hand book is the reference book most frequently consulted by the working scientists and technologists. These compilations are found in other fields but, they are seen at their best in science and technology. For example, the Standard Handbook for Mechanical Engineers (McGraw-Hill, 7th edn. 1967), Chemical Engineers Handbook (McGraw Hill 5th edn. 1973), Handbook of the Engineering Science etc. Handbooks are the first point of call when a straight-forward factual problem arises in a particular subject field. They are day-to-day reference books. They contain what every scientist should know.

Summary for Session 7
In this session, you have learned that;

1. The main reference sources in science and technology includes; encyclopaedias, dictionaries, directories, almanacs and handbooks.
2. An encyclopaedia is a reference material which provides background and current information on any topic, written by experts in the field and are usually arranged in alphabetical order
3. The dictionary is another reference source whose purpose is to define commonly used terms in the simplest manner. It also provides information on the spelling, derivations and pronunciation of words or phrases.
4. A dictionary can either be monolingual, bi-lingual or the acronym (abbreviation) dictionary.
5. A directory contains information on contacts of people, organizations or business houses, institutions.
6. Directories can be categorized into three major groups: trade or industrial directories, institutional directories and individual directories.
7. Other types of directories include educational directory, library directory, business directory, telephone directory etc.
8. An almanac is a collection of useful and interesting facts or statistics, usually in the form of tables and often, covering the period of a year.
Self-Assessment Questions for Study Session 7
Now that you have completed this study session, you can assess how well you have achieved its Learning Outcomes by answering the questions below. You can check your answers with the Notes on the Self-Assessment Questions at the end of this material.

SAQ 7.1 (tests Learning Outcomes 7.1 and 7.2)
Discuss five of the main reference materials in science and technology.

SAQ 7.2 (tests Learning Outcomes 7.1 and 7.2)
A dictionary is just a compilation of words and their meanings. Do you agree with this statement? Discuss the importance of the dictionary to a researcher in the field of science and technology.

SAQ 7.3 (tests Learning Outcomes 7.1 and 7.2)
Which of the following books contain opinions instead of facts on science and technology (a) Encyclopaedia of the Animal kingdom (b) Bowker Annual Library and Book Trade Almanac (c) Oxford Advanced Medical Dictionary (d) None of the above.

References
Study Session 8: Compilation of a Bibliography

*Expected Duration: 1 week or 2 contact hours*

**Introduction**

Before you commence this session, you can carry out this activity; pick up one textbook that is closest to you, flip to the back of the textbook. Do you find a list of materials (books, publications, journals or even online materials), with the name of the writer, the title and other details at the back of the book? That is what is referred to as a Bibliography. It is the list of sources referred to when writing a book and this will form the centre of our discourse in this study session. However, the scope of this study will not be limited to bibliographies written in a book, but it will be discussed in the context of bibliography as a book of references. So, you will learn the concept of bibliographic aid, the functions of bibliographies as reference tool in science and technology and the acceptable manner of writing a bibliography.

**Learning Outcomes for Study Session 8**

When you have studied this session, you should be able to:

- 8.1 Define and use correctly all the keywords printed in **bold** (SAQ 8.1)
- 8.2 Highlight and discuss types of bibliography (SAQ 8.2)
- 8.3 Map out the order needed in compilation of a bibliography (SAQ 8.3)

Keyword: **bibliography**

---

**8.1 Meaning and Types of Bibliography**

**8.1.1. Meaning of Bibliography**

*Bibliography* is a listing of the books, articles and other sources used in finding information during research work. A bibliography is one of the types of reference materials. Bibliographies are very important to those carrying out research because they help researchers to locate needed materials with minimal effort; they also enable researchers to check out details about books and how to decide
on which books to be used. The sources could be books, magazines, encyclopaedia, newspapers, CD-ROMs etc. The bibliographic record will include author, title, place of publication, publishers name and date of publication. If it is a journal article it will provide the name of the journal, volume number, issue number, date of publication, pagination, International Standard Book Number (ISBN) International Standard Serial Number (ISSN) for journals.

8.1.2. Types of Bibliography

1. Universal/General Bibliography
   These are those that cover all forms of published items irrespective of subject, geographical scope, period or form. They tend to cover all subjects in all languages and in all countries.

   1. National Bibliography
      This type of bibliography list or cover all form of knowledge published in a particular country within a specific period. It may be published annually or over a longer interval. They are normally published by the national library of each country e.g. British National Bibliography, London: British Library 1950, National Bibliography of Nigeria, Lagos: National Library of Nigeria, 1973.

   2. Trade Bibliography
      These are bibliographies published within a country with a view to selling books published in that country. They generally list only books on sale, therefore, the prices of items listed are provided. They cover books which had been published in the previous years but which are still on sale, hence, they are not restricted to publications produced in a year, unlike a national bibliography which is limited to a particular year e.g. Whitaker’s Book in print (formerly British Books in Print). London: Whitaker, 1874.

   3. Subject Bibliography
      These are list of books on a particular subject. Subject bibliography is the commonest type of bibliography. They are very useful to scholars and researchers on different fields e.g. Bibliographical Encyclopaedia of Science and Technology 2nd edition by Isaac Asiman, New York, (1988).

   4. Bibliography of Bibliographies
      This bibliography performs the functions of a guide to other bibliographies. It compiles bibliographies published in a particular discipline or subject. They are not common and rarely used.
Examples are: Theodore Besterman’s World Bibliography of Bibliographies. Bibliographic Index New York: The H. W. Wilson Company (provides a list of current bibliographies in different fields).

5. **Bibliographic Guides to Reference Books**

They are categorized as bibliographies because they provide a list of reference sources, usually arranged systematically. They guide users to information resources in various fields. Examples are: Walford, Albert John; Guide to Reference Materials 7th ed. London: Library Association, 1998-1999.

**In-text Question**

- In the course of studying study session 8 of LIS 318, Uche is finding it difficult to identify the difference between National bibliography and trade bibliography as both contain materials published within a country. Using your own sound understanding of this concept, briefly point out the difference between the two types of bibliography to Uche.
  
  o The trade bibliography contains materials published within the country with the view to selling those books, hence, it contains a price tag of all the materials; national bibliography does not include prices tags of the materials in it. Can you find other differences? Read section 8.2 again on National bibliography and trade bibliography.

**Compilation of a Bibliography**

As stated earlier in section 8.1.1, the compilation of a bibliography entails gathering of the books, articles and other sources used in finding information during research work. The order of writing a bibliography of the materials listed out in Table 8.1 as it will be discussed is adopted by St. Abysium College and the Harvard System based on the 2002 style manual 6th edition.
Table 8.1. The Order of Writing Bibliography Materials

<table>
<thead>
<tr>
<th>Print</th>
<th>Electronic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multimedia</td>
<td>Referencing</td>
</tr>
<tr>
<td>Book</td>
<td>E-mail</td>
</tr>
<tr>
<td>Encyclopaedia</td>
<td>Encyclopaedia</td>
</tr>
<tr>
<td>Magazine/journal</td>
<td>Internet</td>
</tr>
<tr>
<td>Newspaper</td>
<td>Magazine/journal</td>
</tr>
<tr>
<td>Pamphlet</td>
<td>Newspaper</td>
</tr>
<tr>
<td>CD-Rom</td>
<td>Bibliography</td>
</tr>
<tr>
<td>Video</td>
<td>Citation</td>
</tr>
<tr>
<td>Interview</td>
<td>Lesson</td>
</tr>
</tbody>
</table>

The order presented on table 8.1. is discussed here.

**Books**

Order and punctuation of details

- Author (surname, initials)
- Year of publication
- Title of book (italics or underlined)
- Edition (if applicable)
- Publisher
- Place of publication (place and state, if not a capital city).


**Encyclopaedia – Print**

Order and punctuation of details

- Title of article (single quotation marks)
- Title of encyclopaedia (italics or underlined)
- Year of publication
- Publisher
- Place of publication (place and state, if not a capital city)
- Volume number
- Page number/s

Encyclopaedia (online)

- Title of article (single quotation marks)
- Title of encyclopaedia (italics or underlined)
- Year of publication
- Date it was viewed
- (URL)


Magazine/Journal article print

- Author (surname, initials)
- Year of publication
- Title of article (in single quotation market)
- Title of magazine (italics or underlined)
- Volume number (if applicable)
- Issue number (if applicable)
- Page number(s)


Magazine/Journal article (online)

- Author (surname, initial)
- Year of publication
- Title of article (in single quotation mark)
- Title of magazine (italics or underline)
- Volume number (if applicable)
- Date it was viewed
- URL


Newspaper article

- Author (surname, initials)
- Year of publication
• Title of article (in single quotation marks)
• Newspaper name (italics)
• Date
• Page number(s)


Newspaper article (online)
• Author (surname, initials)
• Year of publication
• Title of article (in single quotation marks)
• Newspaper name (italics)
• Date viewed
• URL


Pamphlet
• Title of pamphlet (italics or underlined)
• Year of publication
• Publisher
• Place of publication

Example: *Preventing Heart Disease* 2000, National Adelaide Heart Foundation, Adelaide.

Internet
• Author/editor (if identified) (surname, initials)
• Last date (if identified)
• Title of article (italics or underlined)
• Name of sponsor
• Date it was viewed
• URL

CD-ROMS

- Title of article (in single quotation mark)
- Year of publication
- Title of CD-Rom (italics or underline)
- CD-Rom
- Publisher
- Place of publication

Example: ‘Encyclopaedia Britannica’ 2003, CD-Rom, Britannica, North-Sydney

Video and Television recording

- Title of video (italics or underlined)
- Date of recording
- Format
- Publisher
- Place of publication (place and state if not a capital city)


E-mail

- Author (surname, initials)
- Year of communication
- E-mail
- Date it was viewed
- Sender e-mail address

Example: Monk, L. 2004, email, viewed 14 May 2007, <monk@eaglenet.com.au>

Personal communication, including e-mail and letters are not usually included in a bibliography unless if otherwise stated.

Summary of Session 8

In this session, you have learned that;

1. Bibliographies are listing of books, articles and other sources used in finding information.
2. A bibliography enables researchers to locate needed materials with minimal effort.
3. Bibliographies are of six (6) types namely: universal/general bibliography, national bibliography, trade bibliography, subject bibliography, bibliography of bibliographies and bibliographic guides to reference books.


**Self-Assessment Questions for Study Session 8**

Now that you have completed this study session, you can assess how well you have achieved its Learning Outcomes by answering the questions below. You can check your answers with the Notes on the Self-Assessment Questions at the end of this material.

**SAQ 8.1 (tests Learning Outcome 8.1)**

Explain the meaning of a bibliography in your own terms and highlight the importance of bibliographies to researchers?

**SAQ 8.2 (tests Learning Outcome 8.2)**

Write short notes on the following

   a. Universal Bibliography
   b. Subject Bibliography
   c. National bibliography
   d. Bibliography of Bibliographies
   e. Bibliographic guides to reference
   f. Trade bibliography

**SAQ 8.3 (tests Learning Outcome 8.3)**

**Activity 8.1**

*Time Allowed: 30 mins*

Write out the order of writing a bibliography of each of the materials listed below. Write your answers in your Study Diary and then compare with the information in section 8.3. You can repeat the exercise until you are familiar with the entire format.

1. Books (print and online)
2. Encyclopaedia (print and online)
3. Magazine (print and online)
4. Newspaper (print and online)
5. Video
References


www.sac.sa.edu/./bibliography.htm.
Introduction
The essentials of library services are to satisfy the needs of its users. To satisfy these needs, the library makes certain information available through these tools: catalogues, indexes, abstracts, bibliographies etc. These tools are used to bring to the awareness of library users the various information carriers in the library such as books, periodicals, audio-visual materials, serials etc. An index is seen as a superior technique for retrieving relevant information contained in documents stored in the library because it analyses each subject to bring out the terms that has been treated sufficiently. In this study session, you will learn about index and types of index, the stages of indexing and the uses of index in science and technology.

Learning Outcomes for Study Session 9
When you have studied this session, you should be able to:
9.1 Define and use correctly all the keywords printed in bold (SAQ 9.1)
9.2 Discuss the stages of indexing. (SAQ 9.2)
9.3 Highlight and discuss the types of indexes (SAQ 9.1)
9.4 Highlight the uses of indexing in science and technology (SAQ 9.3)
Keyword: indexing

9.1 Meaning, Stages, and Types of Indexing

9.1.1 Meaning of Indexing
Indexing is the process of providing a guide to the intellectual content of a document in the collection of a library. It is one of the most crucial processes by which technologists, scientists, individuals and professionals accumulate information and organize them for proper use.
9.1.2. Stages in Indexing a Document

Indexing involves three stages which are represented in fig 9.1

1. **Familiarization stage**: Here, the indexer would have to be sure of what the document is all about. Is it in his jurisdiction or not? This can be done by going through the title, preface, foreword, content pages and introduction. The indexer can also do spot-reading, master the key-words from the document in order to have the general knowledge of what the subject is all about.

2. **Analysis stage**: This stage involves the indexer using his/her initiative to identify the concepts which the book has treated. At times, the indexer may use the exact term of the author or he may formulate another term. These terms are intended to accurately describe the whole document. This is where the indexer displays his subject background. The indexer starts arranging in alphabetical order and not forgetting the pages. The indexer can use manual or computer-based method for the arrangement. For free and natural index, analysis stage is the final stage, but, if the indexer is using controlled indexing, then, he can move to the third stage, which is translation stage.

3. **Translation stage**: In a situation where the indexer used controlled language i.e. where the use of terminology is controlled, the indexer cannot use these terms directly as index terms or access points; thus, the terms have to be translated into an indexing language used by the system which is the language used by both the indexer and the searcher in an information storage and retrieval stage. Some of the common controlled indexing languages are: Sears List...
of Subject Heading, Library of Congress Subject Heading etc. The indexer assigns subject descriptors chosen from the controlled language that the users of the discipline are familiar with.

**In-text Question**

- From what you have learnt here, indexing is not done haphazardly as it requires some level of organization in the process. At what point do you think the indexer uses his/her initiative to identify the concepts which a book has treated?
  - Remember that we have 3 stages in indexing which are; Familiarization, Analysis, and Translation. You can flash back to section 9.1.2. to know where this action falls.

### 9.1.3. Types of Indexes

There are many ways of categorizing indexes. Such as:

- By arrangement
- By searching structure
- By subject fields
- By purpose

However, there are more general ways of categorizing indexes as listed in box 9.1,

**Box 9.1. General ways of categorizing indexes**

The general ways of categorizing indexes as it will be discussed shortly are;

1. Alphabetical indexes
2. Author indexes
3. Book indexes
4. Citation indexes
5. Classified indexes
6. Cumulative indexes
7. **Coordinate indexes**
8. Permutated title indexes

*You can study this part of the section to gain more knowledge on the general ways for categorising indexes.*
1. **Alphabetical indexes**

This entails the arrangement of an index in alphabetical order. It is the most commonly used indexing type because it is more convenient and it follows a familiar pattern. This type of index may follow a classified arrangement or both classified and alphabetical at the same time. The fact is that any classified arrangement needs alphabetical arrangement either as a supplement, either separate or built-in to make it easy for use. An alphabetical index follows the principle of alphabetical order in arranging the main entries, cross references and quantifying terms. All entries, including subject terms, author names, places and chemical formulas are arranged in an alphabetical order. The disadvantage of alphabetical index is that synonyms are difficult to trace entries e.g. the entry “coconut tree”; so, do we look for it, under “tree” or under “coconut”.

2. **Author indexes**

The entry points are people, organization, corporate authors, government agencies, universities etc. Users are guided to titles of document through authors. In order to maintain consistency in author indexes, the following decisions must be made:

- The number of names to be allowed by entries (when the document has multiple authors)
- The method of alphabetizing to be used for titles and prefaces.
- Use of full names or initials.

3. **Book indexes**

This follows alphabetical or subject method. It helps the reader to get information so that they don’t have to read through the entire book. The index of a book is not the substitute of a book but a pointer to the information included in the book. Any good book ought to have an index to make information retrieval process quick and efficient. Just as indexes in a library collection makes it unnecessary for library users to read through all the library books, index of a book makes it unnecessary for book users to read through the entire books in accessing information in such a book.

4. **Citation indexes**

It contains a list of articles with subject under each article of subsequently published papers that cite such articles. For instance, if a particular paper is published, a citation index shows who cited that paper at a later point in time. In other words, this kind of index implies that a cited paper has an internal subject relationship with the papers that cite it. Citation links together papers on a specific topic and the citation index is built on the basis of this internal structure of subject literature.
Advantages of citation indexes

The following are some of the advantages of citation indexes;

- It leads the user to recent book and articles published in that field
- It is progressive rather than regressive (it refers users forward while other indexes refer users backward)
- It is based on the assumption that the authors of the papers are consistent and knowledgeable in their citations and these may not always be true

5. Classified index

In a classified index, contents are arranged systematically by classes or subject headings. It plays an important role especially in scientific indexing. Indexes should be user-oriented but most users find classified indexes difficult to use because the mind-set of every user is tuned to alphabetical order.

6. Cumulative indexes

It is a combination of merging a set of indexes over a period of time which could cover many decades depending on the seriousness of the work. This applies to journals and large important works and they are published as a separate volume. This type of index is usually complex and done by a team of indexers. It also requires serious editing in order to avoid duplication, terminology changes and the needs to adjust the depth of the indexing.

7. Coordinate indexes

This is one of the earliest subject indexes. It involves a combination of two or more single terms. In order to create a phrase that will meet the need of the users, this type of index is useful in specialized libraries where users request multi-terms when information is required e.g. if a user is interested in a document with the information “Better Life” or “rural” or “Women” or rural women” but it is looking out for the whole, therefore, coordinate index is the best for such a user.

8. Permutated title indexes

This is a type of subject index that is based on using the keywords, in a title of a document. This type is based on the assumption that the title correctly reflects the content of a document as the keywords in the title corresponds to the subject terms of the document. Title indexes works reasonably well for highly specific searching provided the titles are highly specific. This type of index helps users decide
if the document would satisfy their information needs. The argument in favour of this index type is that:

- It can be done quickly with minimum cost but it is not as useful as subject indexes.

**Disadvantages of permuted title indexes**

Some of the disadvantages of permuted title indexes are;

- The titles may not accurately reflect the contents.
- The limited number of terms in a title restricts complete subject indication.
- Lack of vocabulary control can increase the retrieval of irrelevant document.

**. The Use of indexes in science and Technology**

Indexes in science and technology can be beneficial in the following ways;

1. Indexes are important tools for controlling literature of science and technology.
2. Cumulative subject index arrangement save scanning because there is only one index to check instead of more separate ones.
3. Index draws attention to existence of publications, evaluates on the basis of comprehensiveness of coverage and speeds announcement of articles as they come out.
4. Index is a guide or pointer which can be used in computer programming (A reference table of computer words or fields contain record location storage, symbols and addresses identifying a specific element in an array.

**Summary for Session 9**

**In this session, you have learned that;**

1. Indexing is the process of providing a guide to the intellectual content of a document in the collection of a library.
2. The stages of indexing are familiarization stage, analysis stage and translation stage.
3. There are many ways of categorizing indexes, such as: by arrangement, searching structure, by subject fields or by purpose.
4. The types of indexes discussed in this study session are: alphabetical indexes, author indexes, book indexes, citation indexes, classified indexes, cumulative indexes, coordinates indexes and permuted title indexes.
5. Indexes can be used for controlling literature of science and technology, draw attention to existence of publications or even serve as a guide or pointer in computer programming.

Self-Assessment Questions for Study Session 9

Now that you have completed this study session, you can assess how well you have achieved its Learning Outcomes by answering the questions below. You can check your answers with the Notes on the Self-Assessment Questions at the end of this material.

SAQ 9.1 (tests Learning Outcomes 9.1 and 9.3)
Discuss indexing and the types of indexes.

SAQ 9.2 (tests Learning Outcome 9.2)
Indexing involves three stages, outline and discuss them.

SAQ 9.3 (tests Learning Outcome 9.4)
In what ways can indexes promote the field of science and technology?

References


Igudia (2010). A lecture note on indexing and abstracting services. University of Ibadan

Study Session 10: Abstract Services

Expected Duration: 1 week or 2 contact hours

Introduction
Just like an index that provides access to documents through index terms by providing the bibliographic reference of the document, the abstract does the same and even goes further to provide a summary of the essential content of a document. It gives a concise and accurate summary of the important contents of the document in a way that it presents a skeletal representation of the original document, thereby serving as a true surrogate of the document. (Aina, 2004). Most often, abstracts can be used to overcome language barrier because many documents originally written in foreign language have abstracts of their documents in English. A researcher or scientist uses abstract for current awareness to avoid literature search. In this session, you will be exposed to the concept of abstract, its uses and types.

Learning Outcomes for Study Session 10
When you have studied this session, you should be able to:

10.1 Define and use correctly all the keywords printed in bold (SAQ 10.1)
10.2 Highlight the uses of an abstract (SAQ 10.1)
10.3 State and discuss three abstract types (SAQ 10.2)

Keywords: abstract, informative abstract, indicative abstract, critical abstract

10.1 Meaning, Uses, and Types of an Abstract

10.1.1 Meaning of an Abstract
An abstract is a summary of a research article, thesis, review, conference proceeding or an in-depth analysis of a particular subject or discipline and its often used to help the reader quickly ascertain the paper’s purpose. When used, an abstract always appears at the beginning of a manuscript or typescript, acting as the point of entry for any given academic paper. Abstracting and Indexing
services for various academic disciplines are aimed at compiling a body of literature for that particular subject. Harrod (1990) defines an abstract as a form of current bibliography in which sometimes books, but mainly contribution to periodicals, are summarized; they are accompanied by adequate bibliographical description to enable it to be arranged in classified order. They may be in the language of the original text or be translated.

Abstracting is therefore the process of expressing the ideas of other people in one’s own words. It also involves reviewing all the points in a document and deciding which ones are important, keeping in mind who the readers of the abstract will be and what they will be seeking.

10.1.2 Uses of Abstract
Abstracts as explained in section 10.1.1. can be useful in the following ways;

1. An abstract saves readers’ time. Instead of scanning the entire document, the reader may decide on its relevance by reading a short representation of it. It assists the reader in determining whether there is a need to consult the full text to gain the needed information.

2. An abstract improves indexing efficiency. An abstract contains terms called index terms relating to the subject of the document. Thus, the abstract is often an integral part of bibliographic record in an indexing system that enhances retrievability of the original documents.

3. An abstract overcomes language barriers: some documents that were written in foreign language have abstracts of their documents in English.

4. Abstract facilitate literature search: Abstract makes literature search by researches quick and concise without wasting their time.

5. Abstracts promote current awareness: Through abstract, people keep up in pace with literature in their field.

In-text Question
• Janet wants to read a book on child delivery. Her friend has recommended three books on the subject for her but she wants to read only one of them. What is the best way for Janet to determine which book will fit her specification?
  o Janet can read through the abstract of each book. Sections 10.1.1 and 10.1.2 provides more information on the meaning and uses of an abstract.
10.2 Types of abstract

Abstracts are written to decrease the time and efforts it takes the search the overwhelming output from research and scholarship around the world. Some types of abstracts will be discussed in this section.

1. The informative abstract

This type of abstract, acts as a substitute for the document. It is a miniature version of the document including the purpose, numerical data, methodologies, formula, conclusions and recommendations. It is often used for experimental work and for specific research reports. It presents what has been done. 100-500 words for each abstract. An informative abstract should cover four essential points:

1) Objective and scope of the work
2) Methods used
3) Results
4) Conclusion

2. Indicative abstract

An indicative abstract describes what a document is all about. It does not report on the actual findings. Therefore, it is well suited to state-of-the-art reviews, literary criticism, lengthy texts, descriptive works and general discussions of a topic. It tends to be shorter than an informative abstract, containing 50 to 100 words. It gives little details and contains less content than the original document. Indicative abstracts abound in phrases such as “is discussed” or “has been investigated” since the treatment is more superficial than in an informative abstract, in most cases, an indicative abstract can be written much faster and is less costly to produce than informative abstracts. An indicative abstract give the reader ample information as to whether the original document should be read and thus serve as a sophisticated selection aid. An indicative abstract simply describes what type of record is being abstracted and what it is about. In most cases, the indicative abstract is somewhat shorter, is written in general terms and does not give the user a progressive account of the paper’s development.
Box 10.1. Uses of Abstracts

Abstracts are useful for;

1. Saving readers time
2. Improves indexing efficiency
3. Overcomes language barriers
4. Facilitate literature search
5. Abstracts promote current awareness

Another type of abstract you need to consider here is the critical abstract as the abstractor opinions are carefully excluded here unlike what is obtained in informative and indicative abstract.

3. Critical Abstract

This is where the abstractor also functions as an evaluator. For indicative and informative abstracts, the abstractor normally functions as an objective reporter; his or her opinions are carefully excluded. For the critical/evaluative abstract, the abstractor deliberately injects his opinions and analysis. The value of critical abstracts is highly dependent upon the subject competence of the abstractor, much more so than for the other types of abstracts. Abstracting services do not generally permit critical abstracts because the service cannot be allowed space or time for reply to criticism. Critical abstracts are printed in Applied Mechanics Review and Mathematical Reviews. Critical abstracting can be a powerful tool. The key, of course, is that the abstractor is sufficiently knowledgeable on the subject and the methodologies in the paper so that he/she can make quality judgements. This kind of abstract is generally used in general papers with broad overviews on reviews and in monographs but is also used for single paper.

In-text Question

- Dr. Jake wrote a book and he intends that his mentor, Prof. Momoh, would write the abstract for him and include his own evaluation of the book. What type of abstract would this be?
  - Critical abstract. Read section 10.1.3 to know why such abstract is termed critical.
Summary for Session 10

In this session, you have learned that;

1. An abstract is a summary of a material.
2. It usually appears at the beginning of a manuscript or typescript.
3. An abstract has proven to be very useful for the following reasons: it saves readers’ time, it improves indexing efficiency, it helps to overcome language barriers, it facilitates literature search and promotes current awareness.
4. Types of abstracts includes: indicative abstract, informative abstract and critical abstract.

Self-Assessment Questions for Study Session 10

Now that you have completed this study session, you can assess how well you have achieved its Learning Outcomes by answering the questions below. You can check your answers with the Notes on the Self-Assessment Questions at the end of this material.

SAQ 10.1 (tests Learning Outcome 10.1)

Explain the concept of an abstract and discuss three types of abstract.

SAQ 10.2 (tests Learning Outcome 10.1)

Abstracting services is very important in science and technology. Discuss.

References


en-wikipedia.org/Abstract (summary).


Study Session 11: Reference Queries and Reference Interview

Expected Duration: 1 week or 2 contact hours

Introduction
Reference queries are questions asked by a library user relating to the use of library materials in the reference section of the library. People’s reference query differs based on their discipline; reference query from a scientist would be different from that of a sociologist, hence, reference queries are usually a person-to-person service. In some cases, reference processes involve interviewing the reader to enable the reference librarian articulate the problem of the user clearly. Therefore, in this study session, you will learn about reference queries and its types and the steps to reference interviews.

Learning Outcomes for Study Session 11
When you have studied this session, you should be able to:

11.1 Define and use correctly all the keywords printed in bold (SAQ 11.1)
11.2 State and discuss four types of reference queries (SAQ 11.1 and 11.2)
11.3 Identify the steps involved in reference interview (SAQ 11.3)

Keywords: reference query, reference interview, directional user query, quick reference query, specific reference query, research reference query

11.1 Meaning and Types of Reference Query

11.1.1 Meaning of Reference Query
The provision of reference services is very important in Library activities. Library users are provided these services on request. Reference queries, therefore, are requests from library users for correct information from the librarian. The librarian then prepares a search strategy by translating the reference queries into the language of the system used in preparing the library catalogue. The result of the search will enable the reference librarian to determine what sources in the library to use in order to provide answers to the query. (Aina, 2004).
11.2 Types of Reference Queries/Questions

Reference queries/questions can come in different forms as presented in box 11.1. and some of these will be examined in this section.

**Box 11.1. Types of Reference queries/questions**

1. Directional user query
2. Quick reference query
3. Specific reference query
4. Research reference query

You can carefully consider these types as discussed here;

1. **Directional user query**: This has to do with a query that is asking for direction or a specific location in the library. For example, the question “Please, where is the dictionary shelf?” is simple and direct. A user may ask the reference librarian to direct him to the binding section of the library.

2. **Quick reference query**: This is where a user comes to the library to ask a question and the librarian does not have to look for so many resources before answering the question. For example, “Who was the vice-chancellor of University of Ibadan between 2005-2009?” “Which country has the largest population in Africa?” Ready reference sources such as almanacs, year books, biographies are used to answer such questions.

3. **Specific reference query**: There are some queries raised by users which usually involve the use of a number of reference sources. Example of such queries includes “the role of women in the development of librarianship in Africa”. In this type of query, multiple reference sources are used e.g. directories, handbooks, encyclopaedias, abstract and bibliographies.

4. **Research reference query**: This is where the reference librarian needs to do more thorough search before providing an answer. Readers may request information on rigorous issues in academic activity. This is usually common among researchers who are investigating certain issues. For example “What is the impact of Library use on the Academic Performance of University students in Obafemi Awolowo University, Ile-Ife, Osun State” such a researcher will need to consult a lot of literature on the topic e.g. indexes, abstract, bibliographies, handbooks, encyclopaedia etc.
Having understood what reference query/question entails, you can now move on to learn more about what reference interview strives to achieve when interfacing with users in a library.

11.3 Meaning and Steps involved in Reference Interview

11.3.1 Meaning of Reference Interview
It is usual for a reference librarian to interview the user to enable him articulate precisely what he/she requires. The librarian may want to know the kind of information needed, how the information is going to be used, how much of the information the user already has about the question and time to be used in finding and using the information. A reference interview becomes important when the query consists of search questions and research questions. Through interviews, many questions can be clarified and ambiguities eliminated. Aina (2004). Reference interview is very important because if the librarian does not understand the query, he/she may not be in the best position to provide the reference service to the user.

11.3.2 Steps involved in Reference Interview
In conducting a proper reference interview, you must strictly adhere to the steps provided here. We have;

1. **Problem:** As a user, there is a problem at hand which has to be solved?
2. **Information Need:** Knowing that there is a gap which requires the assistance of the reference librarian.
3. **Initial question:** This is the time of interaction with reference librarian on the problem at hand.
4. **Negotiated question:** Interaction with the reference librarian. The reference librarian also asks question to know that is required? Is it going to be detailed? Is it an academic work? Why does one need the information? Etc. Negotiated question can take 5 to 15 minutes for the reference librarian to know what the user really requires.
5. **Search strategy:** This concerns the reference librarian, after knowing what the user needs, why he need the information etc. It is now left for the librarian to know how to go about the question, to know the information source and search engines.
6. **Search procedure:** This could be manual or electronic search procedure take into account the nature of information needed and the type of user involved.
7. **Answer:** This is the outcome of the search. This is the information provided for the user to help him/her solve the problem.
8. **Feedback:** The reference librarian is supposed to get a feedback from the user whether the problem has been properly solved or not. Users satisfaction is the utmost priority of a reference librarian. Though, some users may not give the reference librarian any feedback once they are satisfied with the information provided.

**In-text Question**
- Dauda, the newly recruited librarian who is stationed at the reference desk, is near frustration. This library user has come to him with an information need but Dauda does not quite understand what he is asking for. As a more experienced librarian, what must you do to satisfy this user?
  - Conduct a research interview. See more on this in section 11.2.2.

**Summary for Session 11**

**In this session, you have learned that:**
1. Reference queries are requests from library users to the librarian for correct information.
2. The types of reference queries are directional query, quick reference query, specific reference query and research reference query.
3. Reference interview comes in handy when the librarian has to interview the user to enable him articulate precisely what he/she requires.
4. The steps involved in reference interview are: problem, information need, initial question, negotiated question, search strategy, search procedure, answer and feedback.

**Self-Assessment Questions for Study Session 11**

Now that you have completed this study session, you can assess how well you have achieved its Learning Outcomes by answering the questions below. You can check your answers with the Notes on the Self-Assessment Questions at the end of this material.

**SAQ 11.1 (tests Learning Outcome 11.1)**
Differentiate between reference query and reference interview.

**SAQ 11.2 (tests Learning Outcomes 11.1 and 11.2)**
Write briefly on the three types of reference queries.
SAQ 11.3 (tests Learning Outcome 11.3)
Highlight the steps needed for conducting an effective reference interview.

References


Introduction
The 21st century is the age of science. Scientific knowledge is created and communicated largely through teaching and research. Teaching and research depend upon the library and achievements in teaching and research are not possible without the library. Expenses for library resources are considerable and users should therefore be familiar with library materials and their applications. User education is a vital tool in this process. Instruction in using reference works is an important and effective aspect of user education. Users must be able to discriminate and select from available resources the ones suitable for them. Selection is not possible without sufficient knowledge. Therefore, user education is necessary for the best use of information resources.

Learning Outcomes for Study Session 12
When you have studied this session, you should be able to:
12.1 Define and use correctly all the keywords printed in bold (SAQ 12.1)
12.2 Identify the objectives of user Education (SAQ 12.1)
12.3 Outline reasons for user education (SAQ 12.2)
12.4 Identify some problems militating against the success of user education in Nigerian libraries. (SAQ 12.3)

Keywords: user education

12.1 Meaning, Objectives, Reasons, and Problems of User Education

12.1.1. Meaning of User Education
Gericke (1996) defines user education as teaching the use of libraries and information sources. It includes instruction on the use of one or more reference sources as a part of reference transactions, library use, presentations and bibliographic instruction. User education simply means educating the library patrons, whether students, staff or members of the public, on how to use the library and its
services. It should include any effort or program which will guide and instruct existing and potential users in the recognition and formulation of their information needs in the effective and efficient use of information services and their assessment.

12.1.2. The Objectives of User Education

It is universally acknowledged that the basic objective of user education is to introduce the user to library techniques, library resources and services and thus, turn the potential user into an actual user. Mahdi (2008) has enumerated the objectives of user education as follows:

1. Making the user better informed about the facilities the library can offer so that their requirements will become both better informed and better articulated and so that users become more aware of how they might increase their use of the library services.
2. Providing users with the basic skills of literature search so that they can undertake more of their own do-it-yourself reference service.

In-text Question

- The librarians in the Kenneth Dike library have observed that the library is under-utilised as students only come in to read their own books and borrow just a few books from the library. A research as to the cause of this was carried out and it was discovered that students are not actually aware of other services the library can offer apart from providing a conducive reading environment. What must be done to sensitise the students about all the library services.
  - The librarians should conduct a user education programme. See sections 12.1 and 12.2

12.1.3. Reasons for User Education

If you re-examine the in-text question provided earlier, you will also conclude that a vast number of the library users do not possess the needed information on some of the services offered by the library. Hence, the reasons for user education as discussed here;

1. Tremendous increase in the amount of literature in a variety of forms over the last thirty years.
2. Wide scattering and seepage of information.
3. Many researchers are new to research activity and have no idea of increasing volume of information.
4. Emphasis on inter-disciplinary research.
5. Some psychological barriers and other misgivings about the university library and library services.

6. Changes in the system of examination in tertiary institutions (from annual to semester system) and thereby emphasis on assignments, self-study etc.

7. Gradual application of electronic machines in libraries for information storage, retrieval and dissemination.

8. Absence of proper library guidance at the lower levels (at the school and college levels) which generally leads to ineffective literature search and resultant waste of precious time.


10. The absence of good libraries at the elementary and secondary school levels in the country’s educational system.

**Box 12.1. The Objectives of User Education**

- Making the user better informed about the facilities the library can offer so that their requirements will become both better informed and better articulated and so that users become more aware of how they might increase their use of the libraries services.

- Providing users with the basic skills of literature search so that they can undertake more of their own do-it-yourself reference service.

**12.1.4. Problems of User Education in Nigerian Libraries**

Overtime, user education in Nigerian Libraries is known to be confronted with certain problems as highlighted in this section.

1. **Non-stability of the academic calendar:** There have been unstable academic calendars in Nigerian tertiary institution, thus, making planning and delivery of formal user education programmes like: orientation talks, library guide talk etc. very difficult.

2. **School policy:** Some authorities of Nigerian tertiary institutions do not see the need for user education in their school curriculum, thereby, seeing such an effort as a waste of time.

3. **Inadequate finance:** Nigeria libraries lack adequate funds, it is unable to plan and implement comprehensive user education programmes as it is expensive to do so e.g. to produce pamphlets, handbills, library guides and audio-visual materials.
4. **Shortage of library staff**: Most Nigerians libraries do not have the required staff thereby making it difficult to embark on user education programmes.

**Summary for Session 12**

In this session, you have learned that;

1. User education is simply the teaching of library users and patrons on the use of libraries and information sources.

2. The objective of user education is to ensure that the user is better informed about the facilities the library can offer and provide them with the basic skills of literature search in the library.

3. User education has become pertinent for a number of reasons; increase in the amount of literature over the last thirty years, wide scattering and seepage of information, change in the system of examination in tertiary institutions from annual to semester system, Absence of proper library guidance at elementary and secondary levels, etc.

4. Though it is a laudable initiative, user education is fraught with problems such as non-stability of the academic calendar, myopic school policies, inadequate finance and shortage of library staff.

**Self-Assessment Questions for Study Session 12**

Now that you have completed this study session, you can assess how well you have achieved its Learning Outcomes by answering the questions below. You can check your answers with the Notes on the Self-Assessment Questions at the end of this material.

**SAQ 12.1 (tests Learning Outcome 12.1 and 12.2)**

Define user education and enumerate four of its objectives.

**SAQ 12.2 (tests Learning Outcome 12.3)**

What are the factors that necessitate the introduction of user education programme in Nigerian libraries?

**SAQ 12.3 (tests Learning Outcome 12.4)**

User Education would have been very successful in Nigerian libraries, if not for some factors guiding against it, mention those factors?
References


Study Session 13: The Use of Information Communication Technology (ICT) in Science and Technology

Expected Duration: 1 week or 2 contact hours

Introduction
Today, the world is becoming a global village because information technology (IT) has brought different types of people located in inaccessible territories closer and have made them more familiar. This is made possible by the efficiency, sophistication and reliability of electronic technologies such as computers, satellite operations and the internet. The marvellous benefits mankind has derived over the years as a result of these supersonic information and communication technologies (ICT) and gadgets are reflected in the ease and speed which individuals, corporate organizations, governments and indeed the larger society access, retrieve and utilize relevant information and data (Nwatawala, 2005).

Scientists and researchers have argued that no person or nation can possess all the information required for a particular decision, no matter how affluent. As a result, each entity has to participate in information sharing either through electronic media or interpersonal contact to fill the gaps in his information need. Information and communication Technology (ICT) bridges the gap of distance, time and labour between groups, corporate bodies, government and international agencies on what is in one’s possession, new demands and the possessions that one would want to let out to others. ICT has become the conveyor belt of all manner of transactions of desires. (Forsyth, 2005). In this study session, you will learn more on the role of ICT in areas of science and technology.

Learning Outcomes for Study Session 13
When you have studied this session, you should be able to:
13.1 Define and use correctly all the keywords printed in bold (SAQ 13.1)
13.2 Discuss the relevance of ICT in the field of science and technology. (SAQ 13.2)
13.3 Identify the problems of use of ICT in Nigeria. (SAQ 13.3)
Keywords: Information Communication Technology
Meaning, Uses, and Challenges of Information Communication Technology (ICT) in Science and Technology

13.1.1. Meaning of Information Communication Technology (ICT)

Information Communication Technology (ICT) refers to systems for producing, storing, sending and retrieving digital files. These files can contain text, sounds and images, both still and moving. ICT can be applied in any kind of environment for any kind of job. The characteristics of Information Communication Technology are that they have faster response to enquiries, accurate in data accessibility, sophistication in use, complex in nature, more durable, resilient, effective and efficient (Bartlet, 2002). This definition shows that Information Communication Technology is just the technology of transmitting digital information, its major concern is how to communicate already processed information to the target audience.

13.1.2. Uses of ICT in Science and Technology

ICT has recorded some laudable achievements in the field of science and technology which has also helped in easing the activities of different set of individuals. This section considers some of the uses of ICT as discussed in this part of your study session.

1. **Banks**: The banking sectors increased application has greatly enhanced the quality of their services and delivery time. A mere touch of a computer knob is enough for a cashier to know the financial status of a customer as well as let a customer know his balance with the bank. Payment and receipt of cash has now become hassle free as seen in Figure 13.1, using ATM machines, POS machines or even the mobile phones.

2. **Tourism** – ICT is now an effective mechanism to transmit information on the intangible tourism product because the functionality of this industry rests on the transmission of accurate and reliable information. Before the advent of ICT, seeking and transmitting information were both cumbersome and inefficient. The old methods of seeking and transmitting information included the telephone, the post, directories, brochure and face-to-
face meeting. But now, the internet has become a major business instrument for individuals, groups and organizations to sell, buy, market and advertise (Nwatawala, 2005).

There are a variety of ICT products available in the tourism sector. They are:

a. Computerized Reservations Systems (CRS)
b. Destination marketing system (DMS)
c. Database and home shopping
d. Fax on demand system
e. Teletourist system (based on cellular phones, voice message technology and the provision of audio clip information on a region’s core attraction (Seaton and Bennett, 2000).

**Activity 13.1**

*Time Allowed: 10mins*

With the aid of the brief information you have been provided with in this session, take a moment to reflect on the impacts of ICT in science and technology and make a list of 10 initiatives that are products of ICT.

**Activity 13.1. Feedback**

Your items to list should exclude the ones provided here.

*You can consider some other uses as you proceed in your study*

3. **Agricultural Sector:** ICTs are visibly present especially in the Integrated Pest Management (IPM) scheme. IPM is known to be knowledge intensive and thus, information is the key input for management practices at the farm level. This application of ICT to IPM is known as IPM informatics. IPM informatics is described as computer applications in Integrated Pest Management which encompasses the use of computer-based storage, retrieval, sharing and optimal use of pest management data. The goal of IPM informatics is to bring together data, knowledge and the necessary tools to apply that data and knowledge in decision making process at the time and place that the

![Image of agricultural sector](http://bit.ly/2gOt5h)
decision needs to be made (Bartlet, 2002; Sorby et al. 2003; Bajwa and Kagan, 2001). ICT can also be used for basic agricultural functions like weeding, ploughing, watering as seen in Figure 13.2

4. **Library:** As depicted in fig 13.3, ICT has played a major role in the innovative design of library services and products, packaging and delivery. ICT has reshaped and transformed typical librarian-clientele relationship from a do-it-for-me-syndrome to do-it-yourself situation. This is made possible by ICT manuals. The impact of ICT in librarianship goes beyond that of service quality and user satisfaction. It has tremendously affected the perception, image of both the library and the librarian and at the same time encouraged greater appreciation of the worth and relevance of library and information services especially in the developing countries.

![Figure 13.3. An Image showing ICT in the library](http://bit.ly/2gQpIYD)

Libraries and information centres are involved in information acquisition and processing. ICT is normally applied to facilitate these tasks such as circulation of records, borrowing, statistics, new acquisitions, ordering, creating websites for the library. In the library, acquisition and processing tasks are grouped using the 5Cs.
From table 13.1, you should be able to infer that ICT is a transmission mechanism that ensures accurate and timely delivery of information. It is the communication aspect of information technology utilizing telecommunications and internet. ICT has become the road-map for sustainable dissemination of digital records and feedback. In all sectors of the Nigerian economy. ICT is the “beautiful bride”, fine-tuning, reshaping, restructuring, repackaging, transferring and encouraging effortless use of data and information across the globe.

Before you round up this session, you can quickly examine some of the challenges faced when using ICT as discussed in section 13.1.3.

13.1.3. Challenges/Problems in the Use of ICT

Some of the challenges are:

1. Low level of ICT skill: Inability to use ICT to retrieve relevant information, inability to troubleshoot, learn new technologies, presentation and communication skill, customer services and online services.

2. Restricted access to ICT facilities: users are restricted to the use of ICT facilities due to poor handling and management by users.

3. Language barriers: In libraries and information centres, some information materials may be in foreign language and the user would have to download the material and pay a translator to translate before it can be useful.
4. Inadequate fund to acquire ICT facilities.
5. Delicate nature of some of the ICT facilities.
6. Storage space.
7. Weather condition which may not be suitable for some ICT resources.

Summary of Session 13
In this session, you have learned that:

1. Information Communication Technology (ICT) refers to systems for producing, storing, sending and retrieving digital files.
2. The characteristics of ICT are that it is faster, more accurate in data accessibility, more durable, resilient, effective and efficient.
3. ICT is used in various sectors like Banks, Agricultural sector, Tourism and libraries.
4. In the library, acquisition and processing tasks are grouped using the 5Cs; capturing information, conveying information, creating information, cradling information and communicating information.
5. The problems of ICT in Nigeria are; low level of ICT skill, restricted access to ICT facilities, inadequate fund to acquire ICT facilities, delicate nature of some of the ICT facilities etc.

Self-Assessment Questions for Study Session 13
Now that you have completed this study session, you can assess how well you have achieved its Learning Outcomes by answering the questions below. You can check your answers with the Notes on the Self-Assessment Questions at the end of this material.

SAQ 13.1 (tests Learning Outcome 13.1)
Explain what do you understand by the term Information Communication Technology and state its characteristics.

SAQ 13.2 (tests Learning Outcome 13.2)
Identify the various sectors where ICT is being utilised to improve science and technology.

SAQ 13.3 (tests Learning Outcome 13.3)
The use of ICT in every other area of life has grown in leaps and bounds all around the world. In Nigeria however, the reverse seems to be the case as the growth of ICT is moving at snail speed. Highlight some of the challenges facing the use of the ICT in Nigeria.
References


Study Session 14: Information Agencies in Nigeria

Expected Duration: 1 week or 2 contact hours

Introduction
As you approach the end of this course LIS 315, there is also a need for you to learn about some of the Information sources in Nigeria. As you’ve known that the library is concerned with information generation, organization for use and dissemination of information to end-users. The library is constantly assisted in its task of generation, management and communication of information by some national and international agencies and organizations including the United Nations Educational Scientific and Cultural Organization (UNESCO). In this study session, you will learn of the contributions of organisations, both local and foreign to the promotion of information dissemination in Nigeria.

Learning Outcomes for Study Session 14
When you have studied this session, you should be able to:

14.1 Define and use correctly all the keywords printed in bold (SAQ 14.1)  
14.2 Identify the local and international agencies that promote information dissemination through library in Nigeria (SAQ 14.2 and 14.3)

Keywords: information agency

14.1 Meaning of Information Agencies and Organisations that promote Information dissemination through Libraries

14.1.1. Meaning of Information Agencies
Information agencies are those individual, group, or organization that specialized in information work such as collecting, storing, processing, managing, preserving, creating and disseminating information to enable future generation gain and benefit.
14.1.2. Organizations and agencies that promote Information dissemination through Libraries

There are national and international agencies that promote library services in Nigeria through library friendly policies, donation of money, books, literacy equipment, professional manpower development etc. Some of these organisations are highlighted in box 14.1. as they will be discussed shortly.

Box 14.1. The Organisations that promote information dissemination through Libraries can be categorised into;

1. Local library friendly organization
2. International organisations or agencies
3. National Science and Technology Development Agency (NSTDA)
4. National Health and Medical Research Council (NHMRC)

1. Local library friendly organization

Library is financed by those responsible for its establishment. For example, National Library is financed by the Federal government, public libraries financed by the state and local government through the library boards, research libraries are funded by their parent institutions etc. In addition, the libraries have always appealed to library friendly organizations for support. Prominent among them are:

- National Universities Commission (NUC)
- National Board for Technical Education (NBTE)
- National Council for Colleges of Education (NCCE)
- Nigerian Library Association (NLA)

These organizations make and enforce policies that promote library growth in the tertiary institution. Such policies include; setting standard for minimum collection size, staffing, reading space for library users etc.

2. International Organizations (Agencies) that Support Libraries

The International organization and agencies that support Nigeria libraries include:

- The United Nations Educational, Scientific and Cultural Organization (UNESCO)
- The British Council
- The United States Information Service (USIS)
3. **National Science and Technology Development Agency (NSTDA)**

The National Science and Technology Development Agency (NSTDA) is Thailand’s national agency for science and Technology and one of the leading science and Technology centre in Southern Asia established in 1991 by the Minister of Science and Technology. NSTDA consists of four national technology centres, they are:

a. The national centre for Genetic Engineering and Biotechnology (BIOTEC)
b. The National Metal and Materials Centre (NMEC)
c. The National Electronics and Computer Technology Centre (NECTEC)
d. The National Nanotechnology Centre (NANOTEC)

The main mission of NSTDA is to conduct Research and development in the four main technology areas as well as to support research in universities and other institutions.

4. **National Health and Medical Research Council (NHMRC) and Australia Research Council (ARC)**

They are responsible for supporting research that will build and maintain public health e.g. social environmental, economic and public policy sciences that is relevant to promoting good health.

**Summary of Session 14**

**In this session, you have learned that;**

1. Information agencies are bodies that specialize in information work to enable future generations gain and benefit from it.
2. Libraries are financed locally by their establishing bodies e.g. the government, tertiary institution, etc.
4. International organizations that support Nigeria libraries include UNESCO, British Council, Ford Foundation, The Rockefeller Foundation etc.
5. The National Science and Technology Development Agency of Thailand and National Health and Medical Research Council (NHMRC) and Australia Research Council (ARC) are bodies which are also committed to information in the field of science and technology.

**Self-Assessment Questions for Study Session 14**

Now that you have completed this study session, you can assess how well you have achieved its Learning Outcomes by answering the questions below. You can check your answers with the Notes on the Self-Assessment Questions at the end of this material.

**SAQ 14.1 (tests Learning Outcome 14.1)**

There are different types of agencies registered all over the world. What type of agency will be classified as an information agency?

**SAQ 14.2 (tests Learning Outcome 14.2)**

Outline some local agencies supporting information dissemination.

**SAQ 14.3 (tests Learning Outcome 14.2)**

In the period of economic recession (which started in year 2016), the National Library is short of fund as its local sponsors have also been affected by the recession. Identify international communities that can support in disseminating information in science and technology.

**References**


www.slideshare.net/mahathirmehal

Study Session 15: The Status of Information Profession in Nigeria

Expected Duration: 1 week or 2 contact hours

Introduction
This course began in study session 1, where you were introduced to the concept of information. Can you remember what information is? Information is an asset necessary for the development and prosperity of a society. It is an essential material required for making decisions from the government level to the general level. Today, a country is considered prosperous in socio-economic terms if it is rich in information especially in the field of science and technology. Dependence on information has increased in daily life. Due to technological advances, it has become a basic resource. In this study session, you examine the status of information profession in Nigeria and some of its attributes.

Learning Outcomes for Study Session 15
When you have studied this session, you should be able to:
15.1 Discuss the cycle of information (SAQ 15.1)
15.2 Highlight the attributes of a profession (SAQ 15.2)

15.1 The Information Profession
Libraries and information centres are repositories of knowledge, information and entertainment. They contain books, periodicals, microfilms, print and non-print media for education, research and entertainment. The information profession is among the top ten most important professions in developed countries. Information professionals plan, design and develop the library and information centres at local, regional and global level. Information professionals are those that scientifically organize and disseminate these information sources through vivid processes such as acquisition, cataloguing, classification, reference works and dissemination of information.
15.1.1 Information Cycle

As seen in fig 15.1., the Information cycle can be described as follows:

- **The Creation/origination of Information**: Involves writing, conducting research, painting and production of databases. Institutions responsible for the creation of information include universities, research institutes, government agencies, private organizations, and database producers etc. the originators of information include authors, writers, researchers, government administrators, historians, artists, musicians, database producers, journalists etc.

- **Representation of information**: Involves making the raw information created more useful to end-users. Whatever recorded knowledge that is created, whether printed material or electronic data, the original manuscripts must be presented in a way that is readable or audible in the case of audiovisuals, hence editing is an important component of the information cycle. The process ensures that the document is logically organized, and the language and writing style conform to acceptable standards. Thus, added value is provided to the raw information created. Institutions responsible for representation are publishing organizations, database producers etc.
• **Searching for information:** Involves the scanning for information from books, periodicals, newspapers and magazines, publishers catalogues, indexing and abstracting tools, current awareness tools, relevant databases etc. The institutions that are expected to search for information materials that can be acquired are to search for information materials that can be acquired are libraries, museums, archives, media organization computerized information systems, information centres etc.

• **Selection of information:** Involves choosing appropriate materials from the avalanche of materials that has already been searched. It is more or less a filtering process in which a limited number of materials are selected from a large pool of materials already scanned. A thorough understanding of the clientele is very important. Libraries archives information centres, record management centres, computerized information systems, etc. are generally involved in the selection of information.

• **Acquisition of information selected:** This would be done through appropriate channels like vendors, publishers, database producers, subscription agents, booksellers, aggregators etc. They do it on behalf of libraries, archives information centres, record management centres and computerized information systems, after the information institutions might have selected the materials needed.

• **Organization of information:** This is aimed at making “the information already acquired available to users so that it will be easy to retrieve for use when needed. Common tools used for organization include lists of subject headings, thesauri, cataloguing tools, classification schemes, filing rules, etc. libraries, archives, information centres, record management centres, information companies and databases industries are generally responsible for organizing information.

• **Information analysis:** Involves the provision of labels for materials acquired. This is done through cataloguing, indexing and abstracting. The labels used are the words derived from the document, and they serve essentially as surrogates. Examples are index entry, catalogue entry, abstract etc. In addition to the labelling function of an abstract, it also provides a summary of the content of the document, libraries, archives, information centres, record management centres, computerized information system, data base industries are involved in the analysis of information.

• **Storage of information:** involves storing recorded information in cabinet files, open shelves or electronic forms such as computer hard disks, diskettes, microforms, compact disks, internets, libraries, museum, record management centres etc.
• **Retrieval of information**: is the extraction of documents and the information they contain. Some of the retrieval tools are indexes, catalogues, bibliographies etc.

• **Dissemination of information**: Is done through libraries, archives, records management centres, museums, data base industries, computerized information system etc. Other means of disseminating information are newspaper, electronic news, media and internet providers.

Having considered the information cycle, you can also examine some attributes of a profession in section 15.3.

**15.2 Attributes of a Profession**

A profession arises when any trade or occupation transforms itself through the development of formal qualifications, based upon education, apprenticeship and examination. The following are the attributes of a profession.

1. A profession is learned since it is based on a substantial body of knowledge.
2. A profession is guided by altruism or a concern for the client.
3. A profession has techniques or skills which can be taught.
4. A profession is practical since the body of knowledge can be used to solve human problems.
5. A profession is based on recognition of status.
6. A profession has an organization of the professional group devoted to its common advancement and its social duty.
7. The practitioners of a profession enjoy high degree of autonomy and should have the ability to exercise independent judgement in problem solving.
8. A profession has an official publication for advancement of knowledge of the profession.
9. A profession must be useful to society and its practice should be able to provide adequate means of livelihood for the practitioners.

**Summary of Session 15**

**In this session, you have learned that;**

1. Libraries and information centres are repositories of knowledge, information and entertainment. They contain books, periodicals, microfilms, print and non-print media for education, research and entertainment.
2. Information goes through the following cycle: creation of information, representation of information, searching for information, acquisition of information, organization of
information, information analysis, storage of information, retrieval and dissemination of information.

**Self-Assessment Questions for Study Session 15**

Now that you have completed this study session, you can assess how well you have achieved its Learning Outcomes by answering the questions below. You can check your answers with the Notes on the Self-Assessment Questions at the end of this material.

**SAQ 15.1 (tests Learning Outcome 15.1)**

With the aid of a diagram, discuss the cycle of information.

**SAQ 15.2 (tests Learning Outcome 15.2)**

Is Library and Information Science a profession or a trade? Give reasons for your answer.

**References**


APPENDIX: Notes on Self-Assessment Questions

Study session 1

SAQ 1.1
An information professional is an individual who preserves, organizes and disseminates information. Information professionals may work as professionals in any of the following disciplines: Information scientist, Archivist, Information system Analyst and designer, Information manager or Information broker, Journalist. You can see more of these disciplines in section 1.4.

SAQ 1.2
There are two major departments in a library under which are several sub-departments namely:

   a. Technical services division: comprises of the serial, cataloguing and classification section, acquisition section and bindery section.

   b. Readers’ service department: comprises of reference and circulation section.

Figure 1.2 in the material best depicts this information.

SAQ 1.3
Information includes data, facts, images and things of the like, which are transmitted from one person (the source) to another (the receiver), through a medium (print, non-print and electronic) and which enables the recipient dispel ignorance and make rational decisions.

The channels of information are:

   a. The source
   b. The message
   c. The channel
   d. The receiver

See Figure 1.1

SAQ 1.4
One of the roles of the library in disseminating information is that it serves as a gateway to all types of information needed by members of the society for their daily activities. In schools, research institutes and tertiary institutions, the library provides literature support to teaching, learning, research and community services of the parent institutions.
The role of information technology and its several tools cannot be over-emphasised in disseminating information. One of the roles of the internet for instance, is that it allows access to information sources all over the world at any time.

Study session 2

SAQ 2.1

a. Information need is an individual or group’s desire to locate and obtain information to satisfy a conscious or unconscious need.
b. Information repackaging is the process of making information available to groups of people in a particular format that could best be accessible to them.
c. User analysis is the process of identifying the features of an information user in order to provide appropriate information need.

SAQ 2.2

The nature of his job as a lawyer is the factor leading to Barrister Nsogbuwa’s need for information. Other factors that could create information needs includes: research purposes, preparation for examination, leisure or relaxation, problem solving, education or awareness. (You can see more on this in section 2.1.1)

SAQ 2.3

Repackaging information can be done in any of the following ways:

a) Content Repackaging
b) Medium repackaging
c) Time scheduling
d) User information interface

You can get more on this in section 2.2

Study session 3

SAQ 3.1

Information system is an integrated set of components for collecting, storing and processing data and for delivering information, knowledge and digital products. The advantages of information system include:
a. It ensures easier, faster and cost-effective communication between users.
b. It has created new types of jobs opportunities e.g. hardware and software developers.
c. It has brought the world closer and bridged cultural and distance gaps.
d. It ensures that information is quickly and efficiently shared.
e. Businesses can now be conducted at any time and from anywhere.

SAQ 3.2
Information system comprises of the following components; hardware, software, data, processes and trained personnel. See more of this in section 3.2

Study session 4
SAQ 4.1
Compare your answer with Figure 4.1

SAQ 4.1
The channels of Information in the field of science and technology are; people, journals, community, thesis and dissertation, conference proceedings, reports, patent, trade literature, standards and reviews. See section 4.2

Study session 5
SAQ 5.1
The sources of information are:
1. Primary sources e.g. Research/Technical reports, Thesis/dissertations, Periodicals, Conferences proceedings and Patent.
2. Secondary sources e.g. Encyclopaedias, Dictionaries, Hand books, Directories and Bibliographies.
3. Tertiary sources e.g. Dictionaries, Encyclopaedias, Bibliographies, Almanacs and Gazetteers.

SAQ 5.2
Disadvantages of primary sources of information in science and technology include:
1. It contains information that is not yet tested or proven.
2. It contains opinions of the writer as against facts
3. It is widely scattered, disconnected and unorganized.
SAQ 5.3
Periodicals are journals, newspapers or other publications published at regular or irregular intervals and intended to continue indefinitely.

1. The problem of how to get information about a new publication
2. Cost of continuous purchase of new publication poses another problem.
3. There is also the problem of properly cataloguing a periodical because of the fragmentation of titles.

Study session 6
SAQ 6.1
1. (c) City plan
2. (c) Gazetteer
3. (a) Atlas
4. (b) Globe
5. (d) Travel guide

Study session 7
SAQ 7.1
The main reference materials in science and technology are:

1. Encyclopaedia
2. Dictionary
3. Directory
4. Almanac
5. Handbook

(You may refer to section 7.1 for more explanation)

SAQ 7.2
A dictionary is a compilation of not only words and their meanings, but also their spelling, derivations, pronunciation, manner of usage and so on. To a researcher, a dictionary would serve as a reference material for the purpose of giving meaning to words or phrases used in the field of science and technology in the simplest manner.
SAQ 7.3
(d) None of the above

Study session 8
SAQ 8.1
It helps researchers to locate needed materials with minimal effort.
It enables researchers to check out details about books of their interest.
It helps researchers decide on which books to be used for research work.

SAQ 8.2
Refer to section 8.2

Study session 9
SAQ 9.1
Indexing is the process of providing a guide to the intellectual content of a document in the collection of a library. The types of indexes are: alphabetical indexes, author indexes, book indexes, citation indexes, classified indexes, cumulative indexes, coordinates indexes and permuted title indexes. See section 9.3

SAQ 9.2
Indexing a document will follow these three stages:

- Familiarization stage
- Analysis stage
- Translation stage

SAQ 9.3
Indexes can be used for:

- controlling literature of science and technology,
- drawing attention to existence of publications,
- serving as a guide or pointer in computer programming.
Study session 10

SAQ 10.1
An abstract is a brief summary of a research article, thesis, review, conference proceeding or an in-depth analysis of a particular subject or discipline and its often used to help the reader quickly ascertain the paper’s purpose. Types of abstracts includes: indicative abstract, informative abstract and critical abstract. (see section 10.3)

SAQ 10.2
1. An abstract assists the reader in determining whether there is a need to consult the full text in order to gain the needed information.
2. An abstract improves indexing efficiency.
Other importance of abstract in science and technology can be found in section 10.2

Study session 11

SAQ 11.1
Reference queries, therefore, are requests from library users for correct information from the librarian. The questions come from the library user to the librarian. Reference interviews, on the other hand, are questions asked by the librarian to the librarian to enable him understand and clear every ambiguity in respect of the reference query raised by the user.

SAQ 11.2
The types of reference queries are: directional query, quick reference query, specific reference query and research reference query. See section 11.1.1

SAQ 11.3
See section 11.2.1

Study session 12

SAQ 12.1
User education is the instruction given by librarians to users to enable them to make more effective, efficient and independent use of the materials and services which the library has to offer. Objectives of user education:
1. Making the user better informed about the facilities the library can offer
2. Increase the user’s awareness of the library’s services.

Get more on the objectives of user education from section 12.2

SAQ 12.2
It became pertinent to introduce user education to Nigerian libraries for the following reasons:
1. Increase in the amount of literature across a variety of forms over the last thirty years.
2. Wide scattering and seepage of information.
3. A large number of researchers are new to research activity and have no idea of increasing volume of information.
4. Changes in the system of examination in tertiary institutions from annual to semester system

See more in section 12.3

SAQ 12.3
The problems of user education programmes in Nigerian libraries are caused by factors such as: non-stability of the academic calendar, myopic school policies, inadequate finance and shortage of library staff. See more in section 12.4

Study session 13

SAQ 13.1
ICT can be said to be electronic technologies and techniques used for producing, storing, sending and retrieving digital files and for managing information and knowledge. The characteristics of ICT are that it is faster, more accurate in data accessibility, more durable, resilient, effective and efficient.

SAQ 13.2
ICT is being utilised in the following sectors:

1. Banking e.g. to monitor inflow and outflow of customers’ cash
2. Health e.g. in dissemination of public health information
3. Telecommunication e.g. with the use of the mobile phone, information can reach anywhere.

Other sectors where ICT has improved are; library management, agriculture etc. see more in section 13.2
SAQ 13.3
1. Inadequate fund to acquire ICT facilities
2. Lack of access to ICT facilities
3. Computer illiteracy

You can find more on the challenges of ICT in Nigeria in section 13.3

Study session 14

SAQ 14.1
Information agencies are those individual, group, or organization that specialized in information work such as collecting, storing, processing, managing, preserving, creating and disseminating information to enable future generation gain and benefit.

SAQ 14.2
- The Government (Federal, State and Local)
- National Universities Commission (NUC)
- National Board for Technical Education (NBTE)
- National Council for Colleges of Education (NCCE)
- Nigerian Library Association (NLA)

SAQ 14.2
- The United Nations Educational, Scientific and Cultural Organization (UNESCO)
- The British Council
- The Ford Foundation
- The Rockefeller Foundation
- The Carnegie corporation

See more in section 14.2.2

Study session 15

SAQ 15.1
Refer to section 15.2

SAQ 15.2
Refer to the attributes of a profession in section 15.3