	MASTER OF LIBRARY AND INFORMATION SCIENCE SEMESTER-I	MLIS 201 INFORMATION, COMMUNICATION AND SOCIETY
PUNJABI UNIVERSITY PATIALA		
	UNIT NO. 1	

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Lesson No.

Data, Information and Knowledge : Conceptual Difference

This lesson introduces the concept of data, information and Knowledge in their different dimensions to form a backdrop to the rest parts of the Paper-II ie. Information Communication and Society to follow this segment of the course.

The paper II deals with the value and importance of Information in the present context of socio-economic development of the society. While discussing these facets of information, the network of related concepts associated with information are presented.

1.1.0 Obectives :

After studying this lesson you will be able to know :

(i)   The value of information in today's context ;

(ii)   Distinguish the meaning, distinctive characteristics and interrelationships of data, information and knowledge ; and,

(iii) The data, information, knowledge continuum.

Structure

1.1.1. Introduction

1.1.2. Value and Importance of information

1.1.3. Information : A Network of Related Concepts

1.1.4. Data, Information and Knowledge

    1.1.4.1.   Characteristics and Interrelationship

    1.1.4.2.   Conceptual difference

    1.1.4.3   Meaning of data

    1.1.4.4.   Types of data

    1.1.4.5.   Nature of data

    1.1.4.6   Properties of data

    1.1.4.7.   Scope of data

1.1.5. Data, Information and Knowledge : a Continuum

1.1.1. Introduction

Scientific and technological information made the greatest impact in the post industrial society and contributed a great deal for research and development. Much of the scientific information is open and is freely exchanged, because from the primitive days of human civilization to present day ie. from cave to space, the information has always been a component of growth and improvement in living standards. Therefore, to day information is closely interlocked with growth and development which is reflected in many ways, as seen in the growth of economic, political, social, occupational, cultural and other sectors. But the concept of information has to be understood in its relation to many other associative concepts such as data fact, observation, intelligence, skill, knowledge, experience, wisdom and similar others to perceive the impact of information on todays information society. All these concepts, indeed, very much the creation of human mind. It is, infact, the combination of these concepts and their application for human resources development needed for developement of society. Information and knowledge are, therefore, deliberately being created to meet various challenges of the society Creation of new knowledge and information, their acquisition, processing, storage, retrieval, disseminisation, etc. have become critical areas for the society.

In this lesson, we shall study all these aspects with particular focus on characteristics, interrelationship, and comparative utility of data, information and knowledge and their values as human intellectual capital to be served though libraries and information centres.

1.1.2.   Value and Importance of Information

Information is regarded as a national resources like energy, coal, water, minerals, etc. vital for national development.It is an important "INPUT"for national building. According to IBM the grant computer company "Information is like an inexbaustible and renewable source of energy." Therefore, all societies ancient, medieval or modern have functioned and prospered on the basis of Information and knowledge, innovations and inventions.

In the past application of new information and knowledge was largely accidental ; consequent, progress in the terms of material advancement of life had been slow. From the beginning of nineth century more particularly in the last half century, information has come to accupy

the central position, to be reckoned as a driving force for all human development.

1.1.3.   Information : A Network of Related Concepts :

From the aforesaid discussion it is obivious that information and knowledge are as essential to the development as they have been to source of POWER. But information and knowledge, however, have to be understood in their widest connotation to grasp fully their impact on society. A network of concepts are associated with information and knowledge, such as data, facts, intelligence, know-how, skills, experience and wisdom. It is the combination of all these concepts that go to provide the necessary creative capabilities and competence to transform a non-resource into a value added economic resource. In the next part of the paper we shall digdeep into the essential characteristics, interrelationships, value and use of data, information and knowledge, as these are the ones which are most tangible and could be serviced in libraries in whatever physical form they are available.

1.1.4.   Data, Information and Knowledge

Data, information, knowledge and wisdom are the products of human mind and these are acquired and perfected. They are not equal value in term of utility and application. Rather, they (Data, Information, Knowledge) are evaluated in an ascending scale of values. Data having the least value, wisdom the greatest. These concepts in their totality constitute valuable human intellectual assets and hence, serve as the most precious human capital in all developmental processes.

1.1.4.1.   Characteristics and Interrelationships

Data is usually an observed fact, obtained on the basis of a systematic survey or study, relating to a certain activity. For example, social data with referecne to urban life and civic amenities, government statistics relating to trade, excise duties, taxes, etc. census figures of population records of scientific experimental findings and similar others. These have value with reference to studies on subject connected with these data. These data are analysed and synthesised to derive indicators, provide projections and arrive at valid inference with reference to any event or activity and so on.

Information is obtained through processing of data. The storage, retrieval and processing of data become the essential resource for all economic and social exchanges.These include, population in relation to any country and its eco-social effects.

Knowledge on the other hand, is an organised set of statements of fact or ideas, presenting a reasoned judgement or an experimental result, which is transmitted to others through some communication medium in some systematic form. Knowledge consists of new judgements (research and scholarship) or presentation of older judgements as exemplified in text books, in teaching and learning, and collected as library and archival materials. The interrelationship of the three concepts could well be understood from the chart given below :

It must be clear from the above descriptions of data, information and knowledge, that these three concepts are interrelated. in the sense that *one is the building block of the other.* Data is the building block for information and information is the building block of knowledge.

Much of the confusion arises because these distinctions are ignored in common and popular usage of these words. They are used interchangeably, very often, information standing for knowledge or data. But as information professionals we have to understand their distinctions and interrelationships and serve them according to the needs of users.

1.1.4.2.   Conceptual Differences :

According to Russel Ackoff, a systems theorist and professor or organizational change, the content of the human mind can be classified into five categories :

> (i)   **Data :** Symbols.
>
> (ii)   **Information :** data that are processed to be useful ; provides answers to "who", "what", "where", and "when" questions.
>
> (iii) **Knowledge :** application of data and information, answers "how" questions
>
> (iv)   **Understanding :** appreciation of "why"
>
> (v)   **Wisdom :** evaluated understanding.

Ackoff indicates that the first four categories ie. from (i) to (iv) relate to the past ; they deal with what has been or what is known. Only the fifth categorie, wisdom, deals with the future because it incorporates vision and design. With wisdom, people can create the future rather than just grasp the present and past. But achieving wisdom isn't easy ; people must move successively through the other (Data, Information, knowledge and understanding) categories.

A further elaboration of Ackoffs definitions follows :

Data ... data is raw. It simply exists and has no significance beyond its

existence (in and of itself). It can exist in any form, usable or not. it does not have meaning of itself. In computer parlance, a spreadsheet generally starts out by holding data.

Information ... information is data that has been given meaning by way of relational connection. This "meaning" can be useful, but does not have to be. In computer parlance, a relational database makes information from the data stored within it.

Knowledge ... knowledge is the appropriate collection of information, such that its intent is to be useful. Knowledge is a deterministic process. When someone "memorizes" information (as less aspiring test-bound students often do), then they have amassed knowledge. This knowledge has useful meaning to them, but it does not provide for, in and of itself, an integration such as would infer further knowledge.

Understanding ... understanding is and interpolative and probabilities process. It is cognitive and analytical. It is the process by which one can take knowledge and synthesize new knowledge from the previously held knowledge. The difference between understanding and knowledge is the difference between "learning" and "memorizing". People who have understanding can undertake useful actions because they can synthesize new knowledge, or in some cases, at least new information, from what is previously known (and understood).

Wisdom ... wisdom is an extrapolative an non-deterministic, non-probabilistic process. It calls upon all the previous levels of consciousness, and specifically upon special types of human programming (moral, ethical codes, etc.). It beckons to give us understanding about which there has previously been no understanding, and in doing so, goes far beyond understanding itself. It is the essence of philosophical probing. Unlike the previous four levels, it asks questions to which there is no (easily achievable) answer, and in some causes, to which there can be no humanly known answer period. Wisdom is therfore, the process by which we also discern, or judge, between right and wrong, good and bad.

The following diagram represents the transitions from data, to information, to knowledge, and finally to wisdom, and it is understanding that support the transition from each stage to the next. Understanding is not a separate level of its own.
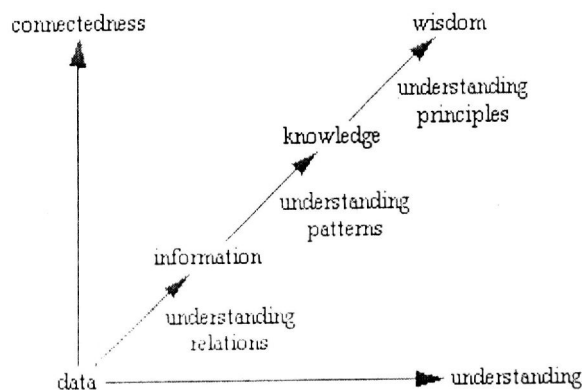
DATA represents a fact or statement of event without relation to other things.

Example : It is raining.

INFORMATION embodies the understanding of a relationship of some sort, possibly cause and effect.

Example : The temperature dropped 15 degrees and then it started raining.

KNOWLEDGE represents a pattern that connects and generally provide a high level of predictability as to what is described or what will happen next.

Example : If the humidity is very high and the temperature drops substantially the atmospheres is often unlikely to be able to hold the moisture so it rains.

WISDOM embodies more of an understanding of fundamental principles embodied within the knowledge that are essentially the basis for the knowledge being what it is. Wisdom is essentially systemic.

Example : It rains because it rains. And this encompasses an understanding of all the interactions that happen between raining, evaporation, air currents, temperature gradients, changes, and raining.

After the above discussion, students are now able to distinguish between data and information, between information and knowledge. Now you can recognize the place of data in the total research process.

The preceeding part of the lesson will be useful in getting yourself familiar with the meaning of data, their types, nature and properties.

1.1.4.3.   Meaning of Data :

The word "DATA" is Latin in origin and literally it means "any thing that is given". Different sources have defined data in different. Some thing given or admitted, facts or principles granted or presented ; that upon which an inference or argument is based, or form which an ideal system of any sort of constucted."

Webster's Third New International Dictionary 'Know facts or things used as a basis for inference or reckoning."

– Oxford Encyclopaedia English Dictionary.

These dictionaries also state that even though data is the plural form of datum it is often treated as a singular collective noun. Hence, its treatment as a singular noun is equally acceptable. For the sake of consistency, however, the word is used in this lesson as the plural form of *datum.*

Data are defined in **McGraw-Hill Encylopaedia of Science and Technology** as numerical or qualitative values derived from scientific experiments. While another definition of data in Sciences is obtainable from CODATA (Committee on Data for Science and Technology) as quoted by Luedke and others in ARIST, 12, 119-181. CODATA defines data as a "crystalized presentation of the essence of scientific knowledge in the most accurate form. According this definition clarity and accuracy are two essential attributes of data.

In **Social Science**, data are stated as values or facts, together with their accompanying study design, code books, research reports etc., and are used by researchers for the purpose of secondary analysis. At one extreme, economic and demography have been heavily quantitative in orientation. At the extreme, anthropology is concerned with qualitative materials or observations. Sociology and, more recently, Political Science, fall between these two extremes. The change in research orientations in the subject can be seen with changing data, especially with data relating to public opinion.

In ***Humanities*** the text such as Biblical materials or Shakespear's drama deals with a fixed quantity of data represented by a finite amount of text to be interpreted. Classhing interpretations may be irresolvable, since each interpretation views the text differently while the text to be interpreted may be finite and fixed. However, in Sciences, the total text is to be interpreted and the text of data is not fixed before interpretation. The text of fact is constantly expanding. Scientists not only observe

facts but also use instruments to generate more systematic data.

In ***Information Science,*** Shuman (BASIS, 1975, 1(7), 11-12, 34) defines data as "quantitative facts derived from experimentation, calculation, or direct observation." Shuman opines that a more meaningful definition of data is "the symbolisation of knowledge".

In order to understand the nature of data, it is essential to classify them into different types in science and social science.

1.1.4.4.   Types of Data

Science :

The **CODATA** Task Group on Accessibility and Dissemination of Data (CODATA / ADD) recognised in 1975 the need for categorising data while working on its report on the Porblems of Accessibility of Data. The Task Group evolved a scheme according to which the following categories of scienctific data are formed :

- **(i)** **Data with reference to time factor :** Based on time factor, data can be classified into the following two types :

- **(a)** **Term independent data :** The term refers to the data which can be measured repeatedly e.g., data in Geosciences and Astronomy such as geological structures, rocks, fixed stars etc.

- **(b)** **Time-dependent data :** These can be measured only once, e.g., certain geophysical or cosmological phenomena like volcanic eruptions and solar flares. Likewise, data pertaining to rare fossils are time dependent data.

- **(ii)** **Data with reference to location factor :** Data with reference to location factor can be categorised as follows :

- **(a)** **Location-independent data :** These are independent of the location of objects measured eg., data on pure Physics and Chemistry.

- **(b)** **Location-dependent data :** These are dependent on the location of objects measured. Data in Earth Sciences and Astronomy normally belong to this category.

- **(iii)** **Data with reference to mode of generations :** These are of three types as below :

- **(a)** **Primary data :** Data are primary when obtained by experiment or observation designed for the measurement, e.g., values of velocity derived by measuring length and time.

(b) **Derived (refromatted) data :** These data are derived by combining servral primary data with the aid of a theoretical model.

(c) **Theoritical (predicted) data :** These are derived by theoritical calculations. Basic data such as fundamenal constants are used in therortical calculations, e.g., data concerning solar eclipses are predicted with the use of celestial mechanics.

(iv) **Data with reference of nature of quantitative values :** These are categorised into the following two classes :

(a) **Determinable data :** Data on a quantity which can be assumed to take a definite value uner a given condition are knwon as determinable data. Time dependent data are usually determinable data, if the given condition is understood to include the specification of time.

(b) **Stochastic data :** Data relating to a quantity which take fluctuating values from one sample to another, from one measurement to another, under a given condition are referred to as stochastic. In Geosciences, most data are stochastic.

(v) **Data with reference to terms of expression :** The categorisation in this case yields three classes of data :

(a) **Quantitative data :** These are measures of quantities expressed in terms of well defined units, changing the magnitude of a quality to a numerical value. Most data in Physical Sciences are quantitative data.

(b) **Semi-quantitative data :** These data consist of affirmative or negative answers to posed questions concerning different characteristics of the objects involved, e.g., in Biology, classification of organism is based upon a set of 'Yes' and 'No' response to questions concerning morphological, biochemical and other characteristics of species. Such data are regarded as semi-quantitative. 'Yes' and 'No' can be coded as '1' and '0' (zero) for obtaining numerical data.

(c) **Qualitative data :** The data expressed in terms of definitive statements concerning scientific objects are qualitative in nature. Qualitative data in this sense are almost equivalent to established knowledge.

(vi) **Data with reference to mode of presentation :** These are categorised as numerical, graphic and symbolic data.

(a) **Numerical data :** These data are presented in numberical values, e.g., most quantitative data fall in this category.

(b)   Graphic data : Here data are presented in graphic form or as model. In some cases, graphs are constructed for the sake of helping users grasp a mass of data by visual perception. Charts and maps also belong to this category.

(c)   Symbolic data : These are presented in symbolic form, e.g., symbolic presentation of weather data.

There are, thus, six basic types of scienctific base. Within these six types, there exist fiteen different classes of data.

1.4.4.1   Types of Data in Social Sciences

As in Sciences, data in Social Sciences are also organised into different types so that their nature can be easily understood. The following categorisation is normally observed in Social Sciences.

(i)   Nominal data : The nominal scale is used for assigning numbers as the identification of individual unit. For example, the classification of journals according to the discipline they belong to, may be considered as nominal data. If numbers are assigned to describe the categories, the numbers represent only the name of the category.

(b)   Ordinal data : It indicates the ordered or graded relationship among the numbers assigned to the observations made. These numbers connote ranks of different categories having relationship in a definite order. For example, to study the responsiveness of library staff a researcher may assign '1' to indicate poor, '2' to indicate average, '3' to indicate good, and '4' to indicate very good, and '4' to indicate excellent. The numbers 1,2,3 and 4 in this case are set of ordinal data which indicate that 4 in better than 3 which in turn is better than 2 and so on. The ordinal data show direction of the differences and not the exact amount of diffference.

(c)   Interval data : Interval data are ordered categories of data and the difference between various categories are of equal measurement. For example, we can measure the IQ (Intelligence Quotient) of a group of children. After assigning numberical value to the IQ of each child, the data can be grouped with interval of 10, like 0 to 10, 10 to 20, 20 to 30, and so on. In this case, '0' does not mean the absence of intelligence and children with IQ '20' are not doubly inteligent than children with IQ '10'.

(d)   Ratio data : Ratio data are the quantitative measurement of a variable in terms of magnitude. In ratio data we can say that one thing is twice or thrice of another as for example, measurements involving

weight, distance, price, etc.

(ii)   Data with references to continuity : Data with reference can be categorised as follows :

(a)   Continuous data : Continuous data are an infinite set of possible values. Between a range there are infinite possible values. For example, height of an individual is not restricted to values like 155 cm. and after that to 156 cm. It can be 155.59 cm. or 155.99 cm. continuous value.

(b)   Discrete data : The discrete data are finite or protentially countable set of values. For example, the number of members in a library. It can be 3,575 or 2,599 but certainly not 2,599½. Similarly the number of citizens in a country, the number of vehicles registered are the examples of discrete data.

(iii)   Data with reference to number of characteristics : Data can also be categorised on the basis of number of variables considered. These are :

(a)   Univariate data : Univariate data are obtained when one characteristics is used for observation, e.g., the performance of student in a given class.

(b)   Bivariate data : Bivariate data result when instead of one, two characteristics are measured simultaneously, e.g., height and weight of tenth class students.

(c)   Multivariate data : Multivariate data consist of observations on three or more characteristics, e.g., family size, income and saving in a metropolitan city in India.

(iv)   Data with reference to time : There are two types of data under this category. These are :

(a)   Time series data : Data recorded in a chronological order across time are referred to as time series data. It takes different times, e.g., the number of books added to a library in different years, month production of steel in a plant, yearly in a plant, yearly intake of students in a university.

(b)   Cross-sectional data : This refers to data for the same unit or for different units at a point of time, e.g., data across sections of people, region or segments of the society.

(v)   Data wtih reference to origin : Data under this category can be put as follows :

(a)   Primary data : The data obtained first hand from individuals by direct observation, counting, measurement or by interviews or mailing a questionnaire are called primary data. It may be complete enumeration or sampling, e.g., data collected from a market survey.

(b)   Secondary data : The data collected initially for the purpose and already published in books or reports but are used later on for some other purpose are referred to as secondary data. For example, data collected from census reports, books, data monographs, etc.

(vi)   Data with reference to characteristics : Data can be categorised on the basis of its characteristics as follows :

(a)   Quantitative data : When the characteristics of observation is quanitified we get quantitative data. Quantitative data result from the measurement of the magnitude of the characteristic used. For example, age of a person, price of a commomdity, income of a family, etc.

(b)   Qualitative data : When the characteristic of observation is a quality or attribute, we get qualitative data. For example sex or colour or a person, or intelligence of a student.

1.1.4.5.   Nature of Data

To make out about the data we must recall, what are data ? and what are the functions data should perform on the basis of classification ?

The **first point** in this is that, data should have specific items (values of facts) which must be identified.

Secondly, specific items of data must be organized into meaningful form.

Thirdly, data should have the functions to perform.

Furthermore, the nature of data can be understood on the bais of the class of which it belongs (Sceince or social science)

1.1.4.6.   Properties of data

On the bases of the definitions followings are the projects of data :

(i)   Amenability to use :

They are not required, if they are not amenable to use. The use many differ with the context.

(ii)   Clarity

According to CODATA definition data are cystalized presantation.

Without clarity, the meaning desired to be communicated will remain hidden.

(iii) Accuracy

Data should be real, complete and accurate.

(iv) Essence

In social science from large qualities of data, they have to be compressed and refined in order to present essence or derived qualitative value, of the nature.

In Social sciences three more qualities are also evident :

(i) Aggregation

Aggregation is comulation or adding up. Commulative percentages are always worked out.

(ii) Compression

Large amount of data are always compressed to make than more meaningful. Compressed data is massage able and can be grasped quickly.

(iii) Refinement

Data require processing or refinement to make them capable.

1.4.7.   Scope of Data

Following are the points of view of scope

(i) Utility of Data

Data have great utility as their are in the growth of knowledge. No research, investigatino, experiment, etc. is possible without data.

(ii) Size of Data

Size of data involves the coverage of the subject under study, data elements, and data population covering documents, data, banks and field survey methods.

(iii) Period of Data

Data collection for any research problem must indicate the time span (current or commultive).

The importance of data in library service is manifold. Librarians are users of data more than one way. They collect bibliographic data for

providing services, and generate and use non-bibliographic data for managing these services. Apart from these, they are required to make available data to researchers and planners according to their subject interests. It is thus necessary to ensure that relevant data sources are available in the library in order that the users may be assisted appropriate and adequate data in their decision process. It is seen that there exists no field of knowledge, no human activity where data can be dispensable. All investigations begin and end with data. In intellectual pursuits data are all pervasive, only their nature varies with the event.

5.   Data, Information and Knowledge : a Continuum

The sequence DATA – INFORMATION – KNOWLEDGE – WISDOM represents an emergent continuum. That is, although data is a discrete identity, the progression to information, to knowledge, and finally to wisdom does not accur in discrete stages of development. One progresses along the continuum as one's undertanding develops. Every thing is relative, and one can have partial understanding of the relations that represent information, partial understanding of the patterns that represent knowledge and partial understanding of the principles which are the foundation of wisdom, as the partial stage. Data information and knowledge are viewed as part of continuum leading to another with no clear boundries between them.
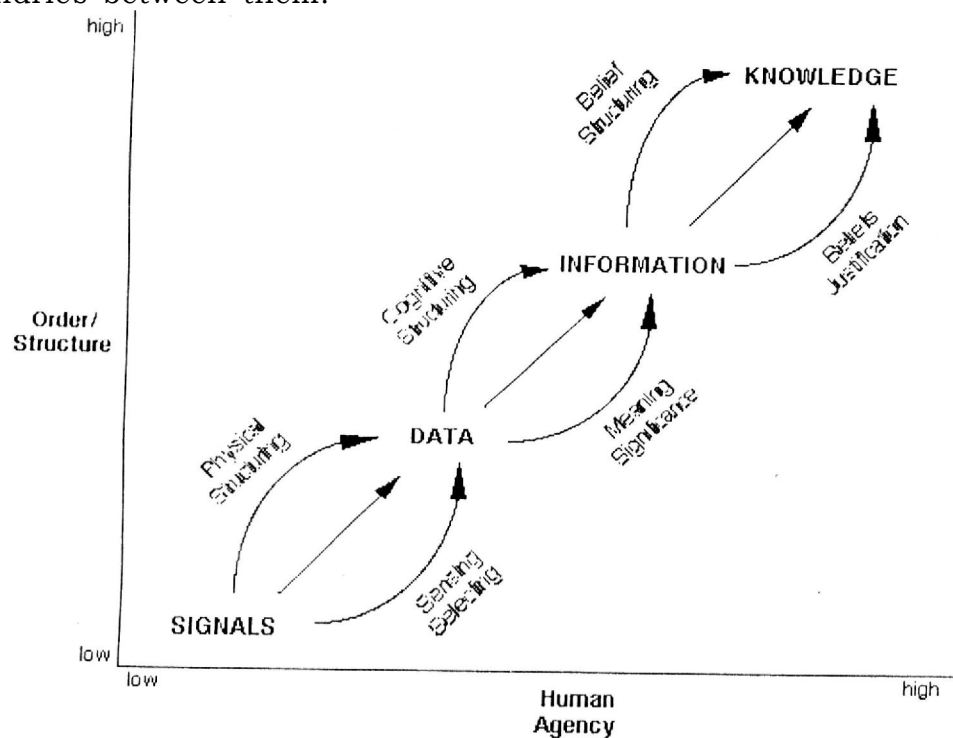
(Data, information and knowledge continuum)

Note : Other two terms i.e. information and knowledge will be discussed in detail in next lesson.

1.1.6.   Conclusion

"Data" literally means any thing that is given. They are facts or information used in discussing or dicishing something. In short, the term "data" includes facts, figures, letters, symbols, words, charts or graphs that represent an idea, object or condition. The term, thus connotes diverse things. Data are measured quantities or derived qualitative values. Data constitute basis for drawing conclusions, taking policy decisions and formulating and unplementing plans.

The scope of data is truely vast in all sciences, all investigations, all human activities, planning and implimentation. All techniques used in research are aimed at collecting objective data which lead to the creation of information, information which lead to creation of knowledge. Data sources form an equality important past of library and information centre resources.

1.1.7.   References and Further Readings

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| **Lesson No. 1.2** | **Author : Dr. Ajit Singh** |

Information and knowledge : definition, Nature, use and Value

From the days of cave life to present flight of space or past-industrial information society, information and knowledge have had a multi-demensional dynamic and turbulentary growth and are continuing to grow. Therefore, it is vital for a library and information professional to comprehend the general trends and special features of the information and knowledge, both personal and social. This lesson is an attempt to provide a overview of some features of these two important segments.

1.2.0 Objectives :

After studying of this lesson you will be able to :

    (i)   Perceive a good overview of nature and definitions of information and knowledge; and,

    (ii)   Obtain a clear insight into types of information and knowledge.

Structure :

1.2.1. Introduction

1.2.2. Information

    1.2.2.1.   General concept

    1.2.2.2.   Information theory

    1.2.2.3.   Definition

    1.2.2.4.   Data and information

    1.2.2.5.   Nature of information

    1.2.2.6.   Properties of Information

    1.2.2.7.   Information : Use and values

1.2.3. Knowledge

    1.2.3.1.   Knowledge spectrum

    1.2.3.2.   Definition

1.2.1.   Introduction

Information consists of data that have been retrieved, processed or othewise used for information or reference purpose, argument or as a basis forcasting or decision making. Information is regarded as a national resource like energy, coal, water, etc. vital for national development.

Knowledge is an organized set of statements of facts or ideas, presenting a reasoned judgement, which is transmitted to others through some communication medium in some systematic form. The results of knowledge are theories ; the efforts to establish relevant relationships or connection between facts, data and other information in some coherent form and to explain the reasons for these generalization. Knowledge is a summation of many bits of information or data, organized into some sort of coherent entity. Comprehension and understanding results from the acquisitions of information.

According to Fritz Machlup, information is a process, a flow of messages involving, the act of telling or being told ; and knowledge is a state of sense of knowing, an accumulated stock.

The differences between information and knowledge are as under:

Information	Knowledge
Is a piecemeal, fragmented, particular	Is structured, coherent and often of enduring significance.
Is a timely, transitory, perhaps even emphemenal ; and	Is a stock, largely resulting from the flow, inputs of information ; and
Is a flow of message	May affect the stock of knowledge by adding to it, restructuring it or changing it on any way.

To under stand the terms we shall discuss both terms separately.

1.2.2.   Information

The word 'information' is defined or interpreted very differently in the disciplines that have information as their core area of study and research. The nature of information is that it is an element of a knowledge spectrum (Debons). Here data, information, knowledge and wisdom are viewed as part of a continuum, one leading into another, each the result of actions on the preceding, with no clear boundaries between them.

1.2.2.1. General Concept

According to Shera, information is that, which is transmitted by the act or process of communication, it may be a message, a signal, a stimulus, if assumes a response in the receiving organism and, therefore possess a response potentials… its motivation is inherently utilitarian… it is instrumental and it usually is communicated in an organised or formalized pattern, mainly because such formalization increases potential utility.

1.2.2.   Information Theory

Before we consider the definitions of information, let us briefly sketch the theory of information of Shannon/Weaver as it has been a source model which has inspired quite a few studies in Library and Information Science.

This theory pertains more accurately to the communication process of signal transmission and has an extremely sophisticated mathematical base for examining the effects of transmission of messages. When the communication engineers use the word 'information', they are not concerned with contents but with signal transmission. They do not deal with the contents that are to be communicated but the instructions that the sender, by signals, conveys to the receiver to select a particular message from the given ensemble of possible messages. Therefore, in this narrow technical sense of the term, information is the statistical probability of a sign or signal being selected from a given set of signs or signals.

This model has been simplified into a flow model viz.

        Source   Message   Channel   Receiver

This model recurs implicitly or explicitly in many of the information transfer systems that have been evolved dealing with contents of information as well.

1.2.2.3.   Definitions

Most writers take the position that the word "INFORMATION" is used with many different connotations and a single precise definition encompassing all its aspects can not , in principle, be formulated. Whatever the definitions of these basic concepts of information, a science of information could be useful for studying the structure of information.

According to ALA World Encyclopaedia of library and information service, information is a property of data resulting from or produced by a process that produced the data.

According to Ford : "The structure of any text which is capable of changing the image structure of a recipient is information."

Psychological Explanation

"Information is the product of the human brain in action. It may be abstract or concrete. When an individual begins to think, a variety of immages and sensations flash across his mind. This makes some information to accumulate in his mind and his memory retains some pieces of knowledge",says Viswanathan.

Inference

From the above statements, we can infer that :

(a)   Information is the data, that have been retrieved and processed ;

(b)   Information may be a message, a signal, or a stimulus ;

(c)   Information is meant for communication and it is capable of bringing a change in the recipient ;

(d)   What we often call information is only a random collection of data, until it is used by someone to achieve a specific purpose ; and

(e)   Information reduces the uncertainty when used.

1.2.2.4.   Data and Information

According to Faibisoff and Dely, data can be numerically expressed, that is, quantified, quantifiable or objective. Data is highly repetitive or quantified or quantifiable. It is characterised as narrative and subjective. Data then are number or unit facts, frequently repeated. Whereas, information is an idea. Information is a symbol or a set of symbols, which has the potential for meaning.

Relevance to Library and Information Science

Libraries and information centres have always been concerned with

information and knowledge, as these constitute their basic stock-in trade. The emphasis has been on developing better tools and techniques for organising, managing and servicing recorded data, information and knowledge irrespective of their physical media. They have never been so much concerned per se with universal definitions of data, information or knowledge as they were with supplying relevant information, data or knowledge to those who seek them without making any distinctions between them.

Nevertheless the debates and discussions on the nature and definition of information should provide us a sharper focus on the contents and quality of information service to users either for reducing uncertainty to their prior information or perceptions, or help in taking right decisions in different context or aiding their studies or research or adding to or enriching their already existing knowledge. The main concern of library and information scientists involved in a communication transfer process is about the intellectual and semantic contents of information and provision of high quality service.

Another point to be noted here is that the words nature, definition, type, property, scope of information are not mutually exclusive both in their meanings and usage. Their meanings overlap very considerably and hence their usage should be understood in their contexts.

1.2.2.5 Nature of Information

Information has no single universally accepted definition, there is no one single way we can group or classify information. In fact, the types of information could be grouped using different characteristics depending upon the purpose of such a classification. Keeping these in view, let us choose a set of characteristics on the basis of the modified Shannon / Weaver Model of Information Transfer with an added one viz., information needs. These are :

> **(i)** **Sources** is the mode of communicating message through signs, symbols, texts or graphics.
>
> **(ii)** **Channel** refers to the established carries that disseminate information or knowledge or an type of their surrogates.
>
> **(iii)** **Media** is the physical media that carry messages or contents of information.
>
> **(iv)** **Recipient** is the ultimate receiver of information who may also generate or create information.
>
> **(v)** **Information Needs** indicate the types of information that are normally communicated to those who seek the different

types of information relevant to their needs. The scope to divide information in this way, however, is almost unlimited.

(i) By Source

Using source as a characteristic, information can be grouped as follows :

> **Signals,** Message in the form of Signs, Symbols, Words and Numbers e.g., Mathematical formulae, Statistical and Factual data, etc.
>
> **Text Matter,** carrying larger amount of messages or information. e.g., News Research papers, Reports, etc.
>
> **Graphics of various kinds**
>
> e.g., Photographs, Pictures, Graphs, etc.

If may be worthwhile repeating here that in his context. Source connotes the way in which information is communicated. i.e., in the form of signals, textual matter of graphics, irrespective of the persons or groups who generate information.

(ii) By Channel

Using Channel as a carrier that disseminates information for grouping information, we have the following in terms of literature, information organisation and institutions and agencies that distribute them.

Literature : Primary, Secondary and Tertiary channels. The different characteristics of these three channels with examples are given below :

Primary

Characteristics	Examples
1. New, Original or new interpretations of known facts and ideas.	Journal Articles, Research Reports.
2. Unorganised and unrelated, each unit being a separate.	Conference Papers and Proceedings, Official Publications.
3. Widely scattered.	Thesis and Dissertations, Project Reports.
4. Unassimilated into the general body of knowledge	Diaries, Memos, Correspondence, Personals Files.

Secondary

Characteristics	Examples
1. Information derived from primary sources.	Bibliographics, Current Awareneess Bulletins.
2. Organised and arranged according to a definite plan.	Indexing Journals, Abstracting Jounals, Reviews, State-of-art.
3. Scattered information collected.	Reports, Progress, Advances, etc.
4. Repositories of assimilated and digested knowledge.	Reference Books, Dictionaries, Encyclopeadias.
5. Bibliographical key to primary literature.	Directories etc.

Tertiary

Characteristics	Examples
1. Compilations of primary and secondary sources.	Bibliographics of Biblographies, Year Books.
2. Organised and arranged according to a definite plan.	Directories Lists of Research in Progress, Guides to Literature.
3. Aids to searching primary and secondary sources.	Information sources, Organisations, Human Resources.

Information Institutions : Libraries, Documentation and Information Centres, Information, Analysis Centres, and such others. These insititutions collect, process, analyse, disseminate and distribute all the three types of literature mentioned above.

Distribution Agencies : Booksellers, Subscription Agents, Clearing Houses, Information Brokers and such others. While information institutions are essentially agencies involved in the provision of

Information Science with reference to specific clientele, distribution agencies are largely commercial agencies, selling information. However, these distinctions are getting blurred with the advent of Information Technology.

(iii) By Media

Using Physical Media as a characteristic for grouping information, we have the following :

Oral	:	Person to person, one to one, one to many.
Recorded	:	Paper-print

Microforms

Audio-Visual

Electronic

In the above two categories, we distinguish audio from other types of textual matter, irrespective of the physical media. Oral information refers to voice information with or without any corresponding textual information.

(iv) By Recipient

Using Recipients as a characteristic for grouping, information, we have the following who receive and use information and knowledge for various requirements :

Individuals

Groups

Organisations and

Institutions

(v) By Information Needs

Using Information Needs as a characteristic for grouping information, we have the following Information Needs :

By Standard	**By Type**
Popular	Know-why
Scientific	Know-how
Technical	Show-how

Know-why information : More scientifically oriented information, readily accessible in the numerous, secondary tools, avialable in the libraries and information centres and also easily transferable.

Know-how information : more technically oriented, not noticed in the tools and more difficult to locate and obtain ; less easy to transfer.

Show-how information : operational skills, maintenance and control capabilities, seldom recorded in communicable form, and, therefore, never, gets recorded in any primary or secondary tools. Transferable only through personal contacts and interaction, depending very much upon the willingness of the person who has the skills to share them.

Recipients and information needs, as characteristics for grouping while producing different sets or classes of information, are in fact closely intertwined. As B.C. Vickery puts it, the social position of recipients, their activities, knowledge generation and information input, knowledge structure, ability to assimilate, communication behaviour, etc. may all be a series of influences that will determine the information needs of individuals or groups. Information systems and services must respond to these kinds of requirements.

1.2.2.6.   Properties of Information

Information can be examined from the point of view of its inherent properties. We are studying them here with reference to those that apply to (i) Information in General, (ii) Scientific and Technical Information, and (iii) Information to Technology and Economics.

(i)   General

- Information is not consumed in its use.
- It can be shared by many and can be used simultaneously witout any loss to anyone.
- It is the most democratic resources in that it can be consumed by poor and rich alike depending upon the intake capability.
- Knowledge is dynamic, ever growing and continuing and no final word is said or will ever be said on any aspect of it.

(ii)   Scientific and Technical Information

- Universal, particularly in the Physical, Chemical, and Biological Sciences.
- Open and availabel to all who seek them, through a well organised communication system operating.
- A system of peer review and mode of communication operates in its dissemination.
- Peer group review ensure quality to a large measure.
- Healthy competition results on account of peer review and speedy communication.

- Becomes absolete in fast developing disciplines and the obsolescence factor is quiet high in some of them.
- Exponential growth in scientific publications has been causing concern in accessibility and availability.

(iii) Technological and Economic Information

- Restricted because of time and geographical space bound.
- Competitive because of business interests, sometimes for reasons of security of nations.
- Secretive because of competition and reasons of security.

Information have become powerful weapons for political and economic superiority among nations of the world.

1.2.2.7. Information : Use and Values

Information is vital for the society. No society can exist without information. It is a resource and commodity.

A. Information is a Resource

(i) A Natural Resource

Information is regarded as a national resources like energy, coal, water, etc. vital for national development. An important 'input' for nation building. Mr. David Sronoff. Former President of Radio Corporation of America once said that the impact of fast, reliable and inexpensive information would be as great as that of electricity in national and international economy. IBM the giant computer company says that information is like and inexhaustible and renewable source of energy.

(ii) Information is the Major Criterion

Presently the world is divided on economic consideration into (economically) developed and (economically) developing countries. In future the division will be based on possession of information into information-rich or data-rich nations and information-poor or data-poor nations, says Schiller.

(iii) Information is a Commodity

Some view of information as a commodity and use this perception to make a case for regulating its flow just as other commodities are regulated. If information is thought of as being on a "Continuum ranging from raw data to finished information". Its regulating will be affected in the future by the value of information as it is perceived by tax authorities. But it is not easy to assign value to ideas to even to determine ownership, even though information can be very expensive to produce.

B.   Information as a Thing

Buckland points out that in order to communicate knowledge, it must be expressed or represented in some physical way as a signal, text or communication. Any such expression would therefore, constitute information as 'THING'. Traditionally there has been an economic dimension to the perception and use of information. The notion of information as resource attracts information economics and spread to such diverse disciplines like management, value of information, transport and communication, consolidation and repackaging, pricing, marketing, distribution exchange etc.

Arguments aginst the concept of Resource

There are, however, difficulties with the treatment of information as a resource, not least those setmming from its inherently intangible nature, and the fact that, unlike physical matter, information *per se* as is not subject to the kind of laws that would enable it to be treated in economic terms. Some writers have also warned against the dangers of a premature acceptance of the arguments in favour of the resource characteristics of information.

Although for above criticims are not to be taken lightly, in the light of the fact that information as a resource has been well established which is evident from the profusion of national and international laws and policies relating to storage, transmission and information related services including transborder data flows.

(i)   Commodity Vs. Resource

The concept of information-as-commodity is wider than that of information-as-resource, as it incorporates the exchanges of information among people and related activities, as well as its use. The notion of information as a commodity is tied closely to the concept of value chains, with commoditized information gaining in value as it progresses through the various steps of creation, processing, storage, distribution and use.

(ii)   Non-materiality Problems

Though information is regarded as a resources for national development and a commodity that satisfy the economic principles of generation of gathering, processing, storage, dissemination, the non-materiality of information creates several problems like measurement, appropriability ownership, impact, costing, etc.

(iii)   As a Constitutive Force in the society

Those definitions which portray information-as-a-constitutive-force-in

society are seen as beign of a higher order than those to do with the resource characteristics or commodity status of information. Definitions in this category grant information and active role in *shaping* context. Information is not just affected by its environment, but is itself an actor affecting other elements in its environment. Information is not just embedded within a social structure, but create that structure itself.

1.2.3.   Knowledge

"Knowledge" is the result somebody applying the refiner's fire to the mass of facts and ideas selecting and organizing what is useful to somebody. Most knowledge is expertness in a field, a subject, a process, a way of thinking, a science, a technology, a system of values, a form of social organization and authority. Thus knowledge is that which is contained in the subjective realm.

The librarian uses the term "knowledge" in his or her professional activities and refer to the recording to human knowledge in books, journals and other media. Professionally we have to distinguish between different fields of knowledge, or different ways of knowing, whom we classify a book, decide on the nature of its thought content and assign it to place in a classification scheme.

"Knowledge" and "Information" are often used interchangeably in ordinary discourse. The reason is lack of 'Precision' and the fact that the verb 'to know' is given many tasks to perform-especially in English language.

Wisdom is integrated knowledge-information made particularly useful by creating theory rooted to disciplined knowledge but crossing disciplinary lines.

Thus the three terms though related, are quite, distinct and are for human 'acquisition' though reading, study, and practical experience. To summarise, 'information' applies to facts total, read or communicated when may be organized and even unrelated 'knowledge' is an organized body of information and 'wisdom' is a knowledge of people, life, and conduct, with the facts so thoroughly assimilated as to have produced sagacity, judgement and insight.

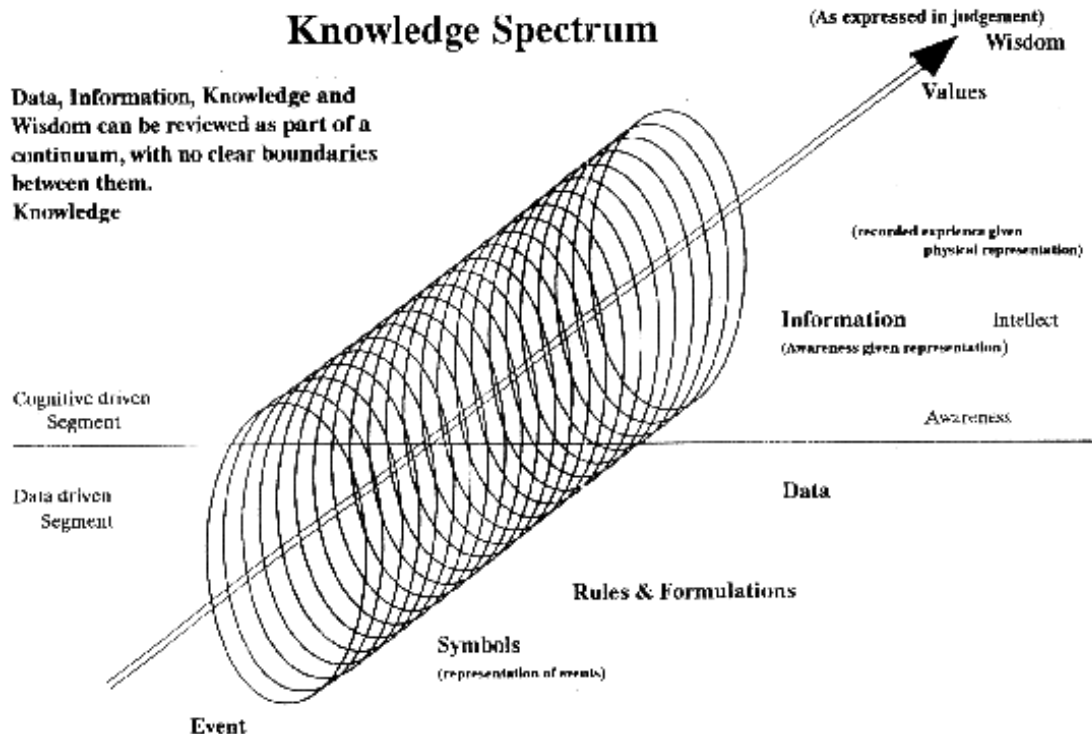## 1.2.3.1   **Knowledge Spectrum :**

Knowledge Spectrum

(As expressed in judgement)
Wisdom

Data, Information, Knowledge and
Wisdom can be reviewed as part of a
continuum, with no clear boundaries
between them.
Knowledge

Values

(recorded experience given
physical representation)

Information   Intellect
(Awareness given representation)

Cognitive driven
Segment

Awareness

Data driven
Segment

Data

Rules & Formulations

Symbols
(representation of events)

Event

Diagram 1 :   Knowledge Spectrum

According to Peter Drucker "Knowledge in the modern information age is the central capital, the cost centre and the crucial resources of the economy."

1.2.3.2.   **Definition of Knowledge**

Knowledge can be defined as a body of facts and principles accumulated by human kind or the act, fact, or state of knowing. While this definition may be true, it is far from complete. We know that knowledge is much more than this. It is having a familarity with language, concepts, procedures, rules, ideas, abstractions, places, customs, facts and associations, compiled with an ability to use there notation effectively in modeling different aspects of the world. Without this ability, the facts and concpets are meaningless and, worthless. The meaning of knowledge is closely related to the meaning of intelligence. Intelligence requires the possession of and access to knowledge. A characteristic of intelligent people is that they possess much knowledge.

In biological organism, knowledge is likely stored as complex structure of inerconnected neurons. The structures correspond to symbolic representations of the knowledge possessed by the organisim, the facts, rules, and so on. The average human brain wieght about 3.3 pound and contians an estimated number of 10^2 neurons. The neurons and their interconnection capabilities provide about 10^{14} bits of potential storage capacity (Sagan, 1977).

In computer knowledge is also stored as symbolic structures, but in the form of collection of magnetic spots and voltage states. State-of-the-art storage in computer is in the range of 10^{12} bits with capacities doubling about every three to four years. The gap between human and computer storage capacities is narrowing rapidly.

1.2.3.3.   Nature of Knowledge

From the above discussion it is clear that it is difficult to define precisely the parameters of the universe of knowledge, it is possible to spell out its scope to a certain degree. Alvin Toffler, giving a wider meaning of knowledge includes data, information, images and imagery, as well as attitudes, values and other symbolic products of society whether true, approximate or even false. The nature of knowledge, is definitely expandable. It is turbulantory dynamic. The Control of knowledge is the crux of a world-wide struggle for power. KNOWLEDGE ABOUT KNOWLEDGE is, therefore, deemed to be the greatest sources of power that one can possess.

The knowledge base to day includes much more than the traditional sections-natural science, social science and Humanities. It covers a nations strategic conceptions, its foreign intelligence, its capabilities, its cultural and ideological impact on the world, its communication system and a whole range of new ideas, information and imagery following through them.

1.2.3.4.   Types of Knowledge

Knowledge can be classifed as under :

(i)   Personal knowledge (Private knowledge)

it is the knwoledge of the mind of an individual and as such is available only to him or her or through him/her to other if communicated.

(ii)   Social knowledge (Public knowledge)

It is the knowledge possessed collectively by a society or a social system. It is supposed to be freely and equally available to all the members of the society. Libraries and information centres provide this kind of knowledge.

These two kinds of knowledge are not mutually exclusive. Social knowledge and is from personal knowledge that most of social knowledge is built.

Ziman, a well known physicist, emphasises the importance of the organization of public knowledge. According to him, there are three aspects to organization of public knowledge, viz.

(a) Organzation by Creation

Is the result of the effects of those who generate knowledge by means of experiments and other methods of investigation and record them in a form to be communicated.

(b) Self-Organization

It refers to the references cited by any document to another documents establishing a thought link between the citing and cited documents. When extended, it provide a very interesting intellectual organization of knowledge that cuts across conventional classification norms known by the libraries.

(c) Bibliographic Organization

Refer to the organization of primary documents in bibliographic, indexing and abstracting jouranls and various other types of information products and services.

All these types of knowledge are handled by the libraries and information centres.

1.2.3.5. Knowledge : Utilization

"The notion of adapting knowledge to the needs of society dates back to the Greeks and is a theme running through much of western thought". Rogers (1983) traced the history of knowledge utilization as a specific 'field of inquiry back to the European beginning of social science with **Gariel Trade's Laws of Limitation.** Knowledge utilization as a field of research and scholarly activity reflects the increasing importance of knowledge in all human activities.

The concept of knowledge utilization is found not only in social science but also in Information Science, Administration Science and diffusion research.

Knowledge use includes a variety of interventions aimed at increasing the use of knowledge to solve human problems. The filled embraces a number of sub-topics, each of which has its own body of work and professional traditions. These areas of knowledge utilization are :

(i) Technology transfer ; (ii) Information dissemination and use ; (iii) Research

utilization ; (iv) Innovation diffusion ; and (v) sociology of knowledge.

A review of early articles on the subjects depicts two reason for this terminological shift found in the purview of the subject :

(i)   Knowledge society books by Fritz Machlup, Danild Bell and others were beginning to appear. Knowledge was the commodity produced and utilized by the knowledge workers. For the first time it was possible to "PACKAGE" specialized knowledge and sell it with a system that can use it to reason and draw conclusion. This can be used as a reliable advisor that gives high level professional advice in specialized areas, such as (i) manufacturing technology ; (ii) Sound Financial Strategies ; (iii) Optimal Forming Plans ; and (iv) Many other important matters. Those who create and marked such system will have more than just an economic advantage over the rest of the world as done in the case of Japanese. Now it is labeled as knowledge Industry.

1.2.3.6.   Knowledge : Value

Knowledge industries are acquiring increasing dominance in many countries. The socio-economic development depends largely on Infromation knowledge industries. It has been estimated that in Germany, Sweden, Australia, Japan, United Kingdom and The United State over are third of the population is involoved in knowledge industries. With the development of information environment, rapid progress has taken place in communication, and information technology which facilitate use of knowledge by society. It is sad that big gaps in access, distribution and use of knowledge are existing between developed and backword countries. Therefore, countries that have organized maximum accers to use knowledge possess a strong power advantage over underdeveloped countries.

The basic problem for knowledge utilization is to identify and locate appropriate knowledge out of the multitude of resources. In poor countries organization of knowledge is a very poor shape manily beacuse it is disorganized. Information and knowledge cannot be utilized unless they are scientifically organized Information Science has emaged as an interdisciplinary field to help and solve the problem through organization and dissemination of knowledge/information. The sole objectives of library and information science is to put knowledge and information to use by all from generators to users.

1.2.4.   Conclusion

Information is seen as an element of knowledge spectrum with all its

implication for a multiplicity of studies with information as a central theme. This approach has given rise to the development of a number of discipline, each of which has a specific focus on information. The definition of information, therefore, have a wide ranging variety and no one single definition has emaged as common to all the discipline.

It has been accepted that information in a vital resources in development activities of any society/nation. This makes it necessary to understand the concept, its nature, etc. the whole gamut of the models and forms of information.

Knowledge can be defined as the body of facts and principles accumulated by human kind or the act, fact, or state of knowing. The meaning of knowledge is closely related to the meaning of intelligence on the other hand, intelligence requires the possession of and acurs of knowledge, and a characteristic of intelligent people is that they have acees to knowledge.

Knowledge/information is vital for the growth and development of any society. The secret of the phenomenal success of the west lies in the appropriate acquisition and utilization of knowledge.

This information/knowledge is often called "POWER", "VITAL" ; "ECONOMIC VALUES" ; a " COMMODITY" ; a "RESOURCE" and so on. Therefore Eliot said,

> "Where is the Wisdom we have lost in knowledge

> Where is the knowledge we have lost information ?"

1.2.5.   Self Check Exercise

Q. 1. What are the main difference between Information and knowledge.

Q. 2. Describe the two Types of knowledge.

1.2.6.   References and Further Readings

(1)   Michael Buckland   :   Information and Information System, 1991

(2)   Meadows, AJ   :   Knowledge and Communication, 1991.

(3)   Duff, A. S.   :   Information Society studies. London : Routledge, 2000.

(4)   Rowley, C. J. & Hartley   :   Organizing Knowledge : An Introduction to managing access to information Ed. 4. 2008.

1.2.7.   Answers to Self Check Exercise

Q.I.   The differences between information and knowledge are as under :

1.2.7.1 Information   Knowledge

Is a piecemeal, fragmented, particular	Is structured, coherent and often of enduring significance.
Is a timely, transitory, perhaps even emphemeral ; and	Is a stock, largely resulting from the flow, inputs of information ; and
Is a flow of message	May affect the stock of knowledge by adding to it, restructuring it or changing it on any way.

1.2.7.2 Types of Knowledge

Knowledge can be classifed as under :

(i)   Personal knowledge (Private knowledge)

It is the knowledge of the mind of an individual and as such is available only to him or her or through him/her to other if communicated.

(ii)   Social knowledge (Public knowledge)

It is the knowledge possessed collectively by a society or a social system. It is supposed to be freely and equally available to all the members of the society. Libraries and information centres provide this kind of knowledge.

These two kinds of knwoledge are not mutually exclusive. Social knowledge and is from personal knowledge that most of social knowledge is built.

Lesson No. 1.3	**Author : Dr. Ajit Singh**

Information Society : GENESIS, Characteristics, Impact and Implications

Society is not static. In the Language of general systems, thereby, it is an open system, a dynamic set of interrelated social systems, institutions and individuals that act upon and react to the various aspects of the world around open systems exist in a state of flux, continually reacting and adjusting to changing conditions and development from both with in and outside system. Due to this nature of the society man has moved from cave to space. The advanced societies are experiencing a transformation to an information society, economically based on exploitation of micro electronic, computing and telecommunication technology.

1.3.0 Objectives :

After going through this lesson you will be able to :

(i)   Indentify the origins of concept "Information society" and its meaning ;

(ii)   Perceive the characteristics of Information society;

(iii)   Impact of Information society on education and economy; and,

(iv)   Impact of Information society on Libraries and Library profession.

Structure :

1.3.1. Introduction

1.3.2. Major Revolution in the Past

     1.3.2.1.   Agricultural Revolution

     1.3.2.2.   Industrial Revolution

     1.3.2.3.   Technological Revolution

     1.3.2.4.   Information Revolutions

1.3.3. Informaton Society : Concepts

1.3.4. Information Society : Definition

1.3.5. Information Society : Characteristics

1.3.6. Information Society : Impact

1.3.6.1.   Education

1.3.6.2.   Economy

1.3.6.3.   Library and Infromation Profession

1.3.7. Impact of Infomation Technology

1.3.8. Information Society : Implications

1.3.8.1.   Economic Implications

1.3.8.2.   Implication of Library Profession

1.3.9. Information Society : Indian Scenario

1.3.10.   Conclusions

1.3.11.   Self Check Exercise

1.3.12.   References

1.3.13.   Answers for Self Check Exercise

1.3.1 Introduction :

Since the inception, human society has been in the process of transformation from one phase to another. Thus the prehistoric and then primitive society at on stage attain the form of industrial society with the industrial development of numerous nature and computer and communication is changing the industrial society to information society. Human society is undergoing a sea change phenomenal growth of information and application of information technology (IT) in the form of high degree of computerization and transmission of electronic information. The new information society combines both continuity and fundamental change. The core tenents of the informaton society is the utilization and exploitation of information for development.

Mankind is now passing through the third industrial revolution. In this context the US sociologist Peter F Drucker has envisioned that real and controlling resources and the absolutely decisive factor of porduction, to day is neither capital nor land and labour, it is information/knowledge. And instead of capitalist and Proletarians, the society are knowledge/ information worker and service worker ... the ruling worker will be knowledge worker, knowledge executive, knowledge professional and knowledge entrepreneurs who have insight to allocate knowledge to productive use.

Similar forecast has earlier been made by another sociologist Daniel Bell that the growth of a new social framework of an information society based on telecommunication might be decisive for the way economic and social exchange are conducted, the way knowledge is created and

retrieved and the character of work and occupation in which man are engaged. The computer in his opinion plays a pivotal role in the revolution.

It is known fact that now society is living in information age where infromation has become very important resources for overall development. Information is presently considered a resources. Its possession and exploitation is giving birth to information as the driving force. Japan and some of western industrial nations experienced dramatic changes in social, economic and technological sphere. This has led to different socio-economic system, which exhibits a high employment of information related occupations and wide diffusion of information technologies. Such a system with centralling of theoratical knowledge based mainly on information, information technology and personnel associated with the whole information affairs has given birth to the new concept of INFORMATION SOCIETY, Where information play a dominent role.

Major Revolutions in the Past

The society has so far witnessed three major revolutions. These are :

      (i)   Agricultural revolution ;

      (ii)   Industrial revolution ; and

      (iii)   Technological revolution.

These three revolutions brought tremendous changes in man's physical, social, economical and political environment and behaviour which led to the change in the systems of the society.

1.3.2.1.   Agricultural Revolution

(i)   Man as a Wanderer

In the beginning man was merely a food-gatherer and primitive hunter. He used to move from place to place to satisfy his two basic needs-the food to eat and water to drink. Exhaustion of the local resources or movement of his prey, made him to shift continously. Hense, he was a wanderer, having no permanent settlement. He practised a subsistence economy, often living on the verge of starvation. The vagaries of climate, ingnorance of storing of food and the carnivorous habit made the man to find a solution to meet his greatest need, i.e. food.

(ii)   Mastering Agriculture

The solution of food problem he found was, agriculture. He started gathering seeds and cultivating them and developed a primitive type of agriculture. In course of time, he mastered the art of cultivation by gaining more knowledge about climate, soil, seeds and so on.

(iii) Beginning of Social Life

From a vagabond life, man developed a social life with settlement. Agricuture made the man to settle one place. Thus, the first revolution in human civilisation is agriculture.

1.3.2.2 Industrial Revolution

(i) Urbanisation

Several geographical factors affect the location of settlements. Important among these are—water supply, natural resources, defence, shelter, trade routes, borders, etc. The Settlements grew in size where the basic requirements of people are met. Thus, townships had developed.

(ii) Industrialisation

The process of industrialisation had thoroughly transformeed the soicety to second revolution in human civilisation. The changes involved in inducstrial revolution are both technological as well as socio-economic-cultural. The technological changes included the use of new basic material, chiefly iron and steel ; new machines like power loom, water mills, steam engine, flour mills, etc. ; and a new organization of work known as factory system emerged.

(iii) Socio Economic Cultural Changes

The socio-economic-cultural changes as a result of industrial revolution can be summarised as – increase in non-agricultural population, improvement in techniques of agriculature, food storage and increased international trade ; shift in economic power from royalty to new industrial tycoons ; change in state policies corresponding to the needs of the industrial society ; working class movements and the emergence of new patterns of authority ; and new system of education and training to create technicians and engineers.

1.3.2.3. Technological Revolution

(i) Continuation of Industrial Revolution

Close to industrial revolution, yet another revolution took place, which could be named as technological revolution. During the period of industrial revolution, nature resources were used as raw material for production ; nature sources of energy like coal, steam, oil were used ; technological advancement was mainly centred round the production, improvement and refinement of basic human needs like, food, shelter, clothing, etc.

(ii) Characteristics of Technological Revolution

There has been a growing specialisation of production. The new scientific

discoveries were put to industrial application. Mass production techniques were evolved. There has been perfection and increased use of precision tools. Man has begun to exploit many natural resources not hitherto utilised. New alloys and synthetic products like, plastic, etc., were increasingly put to use. Nuclear energy is being exploited to its fullest use. Automation resulted in faster production and increased efficiency New mode of transportatinos and communication made it possible for the world to come closer. Air transportation, satellite communication, nuclear energy, exploitation of outer space, improvement in agriculture, health, environment, etc., are some of the results of the technological revolution.

1.3.2.4.   Information Revolution

(i)   Increasing Role of Information

Today we are at the threshold of yet another revolution what is described as 'information revolution.' Since the invention of printing , there has been a continuous revolution in the generation, transfer and communication of information. However, the role of information has attained new proportions with the acceleration of research ; mounting social and population pressure ; changing technological environment ; and increasing needs of planners, decision makers, business houses, executives, lawyers, doctors, and even the common man.

1.3.3.   Information Society : Concept

The term 'Information Society' is said to have been coined in Japan for the first time. The two Japanese cognates "Joho Shakai" when normally translated into english means 'Information Society'. The American Society for Information Science (ASIS) in 1970 organised its annual meeting around the theme "The Information Conscious Society" where the concept of Information Society was explicity used.

As the heart of the 'Information Society' is the idea that advanced societies are entering a qualitatively phase of existence. Just as the industrial society differed from the preceding society, so also the 'Information Society' will be different from the industrial society. The imagery of Alvin Toffler's. *'Third Wave'* capture nicely this epochal transformation. Tom Stonier. *(The Wealth of Information, 1983)* makes explicit parallers and contrasts between industrial and Information Societies. In the Japanese context. Masuda asserts that 'The Infromation Society will be a new type of human society, completely different from the present industrial society.

The 'Information Society concept has close affinities with the theory of

post industrial society of Daniel Bell. Bell also theorised about the Infromation Society' *(The Social Framework of the Infromation Society, 1980).*

(i)   Bell's Theory of Post-industrial Society

In *'The Coming of Post-industrial Society'* (1972) Bell argued that the increased part played by Science in the productive process, the rise to prominence of professional, scientific and technical groups and the introduction of computer technology, are all evidence of a new 'AXIAL PRINCIPLE' at the core of the socio-economic system, namely, the centrality of theoretical knowlege. The emerging social framework of Infromation Society builds upon this base. Information increasingly becomes a source of added value and thus of wealth. A growing proportion of workers is employed in the 'information' sphere.

The important factor, enabling discourse to shift from the post-industrialism to information Society is the *massive growth in the economic significance of Information Technology.*What give the Information Society as boost within the political debates is the depressing context of world regression.

(ii)   Technological Utopianism

Althought in its current form it is something of a novelty, it would be a mistake to think that the idea of Information Society is entirely of recent origin. Alongside the analytical strands of thought about the social change, we also find another theme, technological utopianism. In fact, the writings of Masuda, Stonier and Narsbitt depict as new kind of Society which on one hand, appeals to empiraical analysis but, on the other, is full of good society imagery. Technological Utopianism is especially powerful in the USA.

1.3.4.   Information Society : Definition and Meaning

'Information Society' is a much used expression that has been used to denote many different concepts. The term has been characterised by various dimensions. Several authors have tried to define and interpret this term according to their own perceptions. It is neither possible nor desirable to enumerate and discuss all the definitions of the term due to obvious constraints of time and space. However, an attempt has been made to examine some of the available definitions of the term from the literature and analyse their main attributes.

Blaise Cronin defines Information Society as "one in which labour has been intellectualised ; one in which the expression 'to earn one's daily bread by the sweat of one's brow' sounds decidedly anachronistic". He further observes that "What began life as a sociological construct and

then became a feature of futurologists' clumsy jargon before degenrating into a media cliche, has finaly achieved respectability through endorsement by economic and political analysis."

Manfred Kochen writes that the simple notion of a soicety in which 'information rather than material flows constitute most of its communication and control' exchange is extended to stress that :

     (i)   most members generate knowledge by knowledge based procedures that are knowledge intensive ;

     (ii)   information consistently reflects basic societal invariants ;

     (ii)   reason and human values rather than strength and expediency manage conflicts between pressures to conserve invariants and pressures for adaptive change.

Having said all this Manfred goes on to say that "an information society is a stage in the evolution of **"community brains"**, towards a **"world brain"**.' This is probably most likely to be essence of the 'great transition' that futurists seem to agree on. When enough people begin to believe it as likely to happen if it is a stage in natural cultural evolution, then this belief may contribute to its fulfilment... It will take some decades before this idea is sufficiently widespread and until the first information society appears."

On the other hand Martin maintains that "the term has come to represent societies at an advanced post-industrial stage characterised by a high degree of computerisation, large volumes of electronic data transmission and an economic profile heavily influenced by the marked and employment possibilities of Information Technology."

From the above stated definitions, it is evident that there are a number of different observations writings analysis on 'Information Society'. Also, it can be noticed that two major related factors underlie the Information Society claims. Firstly, that the society is becoming increasingly centered on informations handling, processing, storage and dissemination, using microelectronics-based technologies, specially those made available through the convergence of the computer with telecommunications, namely IT. And secondly, that this shift is reflected in an emerging occupational structure in which the category of 'information workers' has become predominants. The 'Information Society' appears on the scene as an outcome of technological and economic changes.

Initial analysis of an Information Society

At this point it is appropriate to mention that despite the extensive criticism that may be directed against various interpretations of 'Information Society concept,' it does raise crucial empirical and theoretical problems. Daniel Bell has indicated some of these. Others, far more enthusiastic than he, have presented their analysis. The resultant danger as William Melody observes, is that critique of Information Society be characterised more as a direct response to the promotional claims, rather than an attempt to examine rigorously probable implications in the real world. Such rigorous empirical investigation may, of course, detract from or support alternative theoretical explorations. In other word," as a description or theory the Information Society concept is flawed. But, as a problematic which alerts us to some of the most pressing sociological question of our day, it is vital."

1.3.5.   Information Society : Characteristics :

(i)   Economic Character

It is now axiomatic that our economy is shifting from one driven by industry to one driven by information. For two hundred years, we have used paper to manage our industrial economy and paper is usually though to be the hallmark of the industrial economy. In an information society most of the information will be cheaper, occupy less space and can be communicated with greater speed. For transmitting infromation we need a network of telecommunications. Telecommunications is not only the highway to the future, it is the highway of the future in the information economy.

Some see such an economy supplanting our basic industries. Just as industry itself supplanted agriculture. The analogy, however, does not work. For the thing, there will not be the treamendous movement of workers from industry to information that we experienced in the transition from agriculture to industry.

Futher, the information society will supplement, not supplant, the industrial one. It is hoped that it will contribute even more to industry that the machines and chemicals of industry contributed to our great national successs in agriculture.

The combination of data processing and telecommunications will increase productivity both on the plant floor and in the office, says Mc Gowan.

In USA it was said in 1980s, 55% of the workforce was engaged in information activity and 50% of the GNP of USA was derived from information related activities. It was estimated that 85% of the US populations by the end of the 20th century were to be engaged in information activity.

(ii)   Technological Character

The convergence of computing and tele-communications continue to make itself in just about every area of life in modern societies. Computer is driving the new revolution of the late 20th century. Computer has influenced the technological, economic, political and cultural life of the human society. Today compure is boud in every office, on most desks and in many homes. Computers are behind every other change in the society, in industries like banking, automobiles and other means of transport, communication industry, tax, social security, land and other public records, medicine, defence and what not ? Computers are behind evey other change in the society. The revolution in communication of information has created what is some times callled a 'global village.'

Research undertaken by Halal in USA indicated that in the beginning of the 21st century there would be wide spread use of very sophisiticated technology including optical computers, very advanced expert and knowledge based systems and those enabling access to computerized libraries and a variety of information systems.

Even developing societies will soon be having access to services like tele-education, tele-conferencing, tele-shoping, tele-commuting with governments going for e-governance, business going for e-commerce etc.

(iii)   Social Characteristics

Social characteristic of an Inforamtion Society is all the change that could result from pin-pointed and expeditions information. Miles has anticipated the possibility that the interactivity made possible by the information technology based consumer technologies could usher in change in way of life of course, there is always the fear of widened gap between information have and have-nots ; as well as the reemergence of a form of sweated labour in so called telecottages exploited by employers and denied the benefits of emeployee protection and full time contracts.

Masude envisaged in information soiety of which the axis would compirse information values rather than material values and an economy in which knowledge capital would predominate over material capital.

(iv)   Political Characteristic

In an information society, there would be more interaction between the government and the governed. Citizen's participation by way of electronic polling, access to public information under the concept of 'freedom and equality of access to information', interactive with fellow citizens through wired networks–teleconferencing etc. Perhaps the information

superhighway will eventually lead to this 'global village'.

1.3.6 Information Society : Impacts

The impact of information society on various field emanates from the expanding information Technology (IT) which is also called POST INDUSTRIAL SOCIETY. The society has become dependent increasingly on information, to the point of becoming and information society and affected many sectors of the society.

1.3.6.1 Impact on Education

Education plays a very vital and strategic role in society. It have been identified on conscious, deliberate and planned process designed to modify the behaviour in a desirable and socially acceptable way to import specific knowledge Information and skills. These are as under :

(i)   The whole notion of teacher would be changed in the information society. The teacher becomes the facilitator. The teacher is no longer the sage on the stage of education but he guide on the side. He is becoming less central to the learning process.

(ii)   According to Alabach and Peterson, a few of the central issues facing higher education world in the new millennium are :

(a)   The link (missing) between education and work.

(b)   The steady rise of privatization.

(c)   The growing demand for education through out the life cycle.

(d)   Changes to higher education brought by technological innovation.

(e)   Inter-nationalization of higher education.

(f)   Access and equity.

(g)   Accountability.

(h)   Market oriential education.

(i)   The challenge include globalization and creation of global education market.

(j)   ONLINE Education and Virtual University.

(k)   ONLINE Education as a mode of DISTANCE EDUCATION.

(l)   Computer supported collaborative learning where learner in group using their computer on network interact with a web based multimedia curriculum to analyze, synthesize,

       collaborate, refine and constructs their individual knowledge and works on problem at shared learning process to achieve a shared learning goal.

     (m)   From compus class room to home, work place and community based education. From single instituion to consotium of institution networking together by electronic communication.

     (n)   Teacher/Faculty Training : In order to provide training to faculity in information society, a number of short term course, refresher course, workshop, etc.

1.3.6.2   Impact on Economy :

The concept related to the information economy or "Economics of Information" first time coined by Fritz Machlup (1902-1983), consisered as the founder of this discipline, in the seminal work," **The production and distribution of knowledge in the United State",** established the measures of information society in economic terms. The Impact of information society and economies analysis are interelated each other as under :

In the information society, economic structure can be defined by information economy as the total value occuring from information activity through the production, processing and distribution of information goods and servies that are sold by market and consumed interaly by organization. The major components of such and economy are as :

     (i)   Information work Force ;

     (ii)   Information goods and Services ; and

     (iii)   Information Infrastructure.

In the information society, productive activities in which extensive and upto data know-what, know-whom, know-how much, know-why or know-when to necessary to carry them out shall be called KNOWLEDGE BASED. That include nearly all professional such as engineering, law, medicine, architecture, etc.

Economic Analysis :

The post-industrial Society, it is clear, is knoweldge society in a double sense :

     (i)   The sources of innovation are increasingly derived from R & D.

     (ii)   The weigh of the society measured by a large propotion of

gross natural prouduct and a large share of employment is increasingly in knowledge field. Economic analysis for information society made by different scholars is as under :

(i)   Machlup's analysis

Machlup initiated this research perspective by analysing the growth of the "Knowledge Sector" in the US economy. In Machlup's analysis, industries primarily concerned with the production and distiribution of knowledge were examined separately, rather than as a part of the overall service sector. The knowledge industries included such areas as the educational system, the media and other communication activities, libraries and other ifnormation and research institutes. The contribution of this sector to the gross national product was found to be significant (estimated at about 40 percent for the early 960s) and growing at a rate considerably higher than the industrial sector. Machlup concluded that knowledge industries would soon outspace the industrial sector, leading to the rise of a "Knowledge Society".

(ii)   Dataguest (1999) has forcasted that the level of spending on developing knowledge management delivery capabilities will increase from US$410 million in 1994 to $4.5 billion in 1999. By 2005 more than 50 million jobs will belong to the knowledge worker society (US department of Labour).

Emaseo's Analysis

A similar conclusion was reached at about the same time in Japan by Emaseo as he predicted the rise of spiritual industries. Under this head, Emaseo included all activities concerned with the production and consumption of information. These earlier approach distinguished the knowledge or information sector from other economic sector. In recent years, the overall occupational structure of the economy has come to be associated with the transition to an Information Economy.

Marc Porat's Analysis

Marc Porat initiated much of his work, by broadening the view of information work to apply to more than those jobs falling, within the information or knowledge sector as defined by Machlup. Porat defined information activities as including all resources consumed in producing, processing and distribution of information goods and services. According to Porat, the information sector may be classified into primary and Secondary sectors. The primary inforamation sector provides the technical infrastructure for a variety of information processing and transmission activities. It also offers information for sale as computer manufacturing, telecommunication, printing, mass media, advertising,

accounting and education. On the other hand the secondary information sector include such activities as research and development, planning, control, marketing and co-ordination. Porat's secondary information sector has led to the indentification of the information sector in an organisation.

OECD's Analysis

The Organisation for Economic Cooperation and Development (OECD) proposed in 1981 an inventory of information occupations. This contained 284 unit groups embracing 1,560 occupation categories. Information occupations are divided into four categories : information producers, information processors, information distributors and information infrastructure. Information producers create new information or package existing information into a form, appropriate to a particular recipient. Information processors are mainly concerned with receiving and responding to information inputs. Information distributors are primarily concerned with conveying information from the initiator to the recipient. This group include production of elements of information but its main activity is considered distributive. Information infrastructure occupations install, operate and repair the machines and technologies used to support information activities.

Many studies on estimating the information sector as a portion of total labour force have been undertaken in developed countries. For example, it has been stated that in the USA, 31.6 percent of the labour force was engaged in the information sector in 1959, 33 percent in 1963 and 36 percent in 1978. In Australia, the information sector occupied 27.5 percent of total labour in 1976 while in the UK, the information work force is stated to be 36 percent of the total in 1971 and 1977, and in West Germany it was 30.7 percent in 1971 and 1977.

1.3.6.3   Impact on Library and Information Profession

The information profession is a body of people engaged in the generation, collection, codification, storage, retrieval, manipulation, management, dessemination, package, evaluation and marketing of information. The primary function of the information professional is to ensure that society will have the information, it needs to function.

The challenges faced by information profession in the information society could be classified as under :

(i)   Technology Absorption and determinism refer to the tendency to assume that the shape of things to come will be inexorably conditioned by the gathering momentum of technological innovation. The

fundamentalists view is that the pace of development in computer and communication technology will soon make traditional information waker obsolete. The most important action that the members of information profession can take now to ensure the human use of information technology, is to give their profession the value, form, status and indentify to need to meet the challenge posed by the information society.

(ii)   The social, cultural and education role of the information professions is the need to devise ways of effecting a smooth transition from an industrial to an information economy, i.e., to shift labour from the manufacturing to the knowledge industry. The need is, to involve a massive expansion of an updated education system to provide new skill which will useful in an information economy. Information must be repackaged into media most convinient to profile needed it.

Information mangement skills are required by information professionals at various of information cycle ie. Project management, understanding the organization's culture, strategic management, communication skill, marketing skill, vision and creativity.

The other important impacts on Library and Library professions are as under :

(a)   Information Explosion :

Science and Technology knowledge double itself within 7 to 10 years.

(b)   Computer Revolution :

Believe it or not, the computer has come to stay with us, no other single, technological development has the impact on our lives in such a short time.

(c)   Emergence of new disciplines :

In the information society, either new discipline or interdisciplinary R & D workers are more, such as environmental scientists, management, bio-technology and technology assessment that integrate the conceptual approaches and information skills from several filed of research adn application.

(d)   Resistance to change

The library and information professionals need to adopt state of the art technology for handling information science efficiently and offer new products and services to the users. The adoption of I.T. needs eageerness and proper mind setting of applying their technologies to manage the ever exploding information. However, as the human

are resistive to any kind of change, the professionals are also infested with this kind of syndrome. The most important aspect is to keep constant track over change and develop a trend to imbibe the change efficiently is information society.

1.3.7 Impact of Information technology :

Late 1980's witnessed the dawn of another revolution, the revolution which shaped the information soceity.

(c)   Technology of Information Revolution :

Different type of technologies are a part of contemporary information society. Among these are, Advanced semi conductors, Advanced high and computers, Fiber photonics cellutor technology, satellite technolog, Advanced Networking, Improved human computer interaction and Digital Transmission and Compression.

Therefore, in the information society, the information technology has been an engine for socio economic development.

Information Technology revolutions MILITARY TECHNOLOGY as it is catching up in the security system of the country i.e. defence services, paramilitary froces, intelligence servies, etc.

Information Society : Implications

(i)   Economic Implications :

From the economic analysis, we come across several references to the economic implication of information society. There are :

(i)   It has been stated that technologically advanced countries are in the process of moving beyond industrial capitalism to information based economic. Some of the developed countries are already devoting majority of their economic resources to information related rectivities. The Computer, telecommunication and information content, industries are among the most rapidly growing global industries and are expected to be so in future.

(ii)   The state of information in the economy has pervasive effects on the working of the economy generally. It has intense impacts on those sectors that provide information products services such as press, television, radio, film, libraries and other information provides.

(iii)   Another dimension of information economy which we can see emerging today is that the customer will be co-producer of product and services. It will be the responsibility of the manufacture to produce the product up to a certain level in the value chain and than leave it for the customer to customise is to his/her requirement.

(iv) Knowledge based products and services have relatively short life cycle, patent/protection on intellectual properly are still in the developing stage especially in the developing countries. So the life of the proprietory information is short.

In conclusion, it may be stated that the contribution of information to successful economic function is beyond question. However, it is not quiet the same as saying that information has become a primary output of all developing economics. No doubt, we are moving toward information based economics but we still very for from being wholly dependent on the production sale and exportation of information goods and services for presentation of our-economic well being.

1.3.8.2   Implication for Information Profession

In the information society, the quality of life will definitely get improved specially of there who can afford to take advantage of the contributing tactors. Important factor are :

     (i)   Novel and improved hardware technologies.

     (ii)   Efficient and effective software technologies.

     (iii)   Improved management of information resources.

     (iv)   Innovative, secondary information work.

     (v)   New information products.

     (vi)   Efficients and effective information services.

Education for the Information Profession in the Information Society

One of the major tasks facing library educators is to translate all the challenges posed by the Information Society into a rationale for curriculum revision.

There are indictions that educational pluralism can become the norm and that Library Science Schools will co-exist with a variety of other departments in an attempt to meet the manpower needs of particular sectors of information market place.

The rationale for the future development of Libary Science Departments is to combine the traditional currimulum with a wider variety of programme greared to the needs of the 'Information Society'. The market position will have to be surveyed very carefully. This may mean that we will have to invest considerable energy in the promotion or our curricula and our products amongst potential employers if the opportunities afforded by the 'Information Society' are to be grasped. The efforts of all Library Science Schools will have to be directed to provide the students with :

(i)   a broad education that will enable information professionals to fuction effectively in a wide variety of information related agencies, organisatinos and environments ;

(ii)   an education grounded in a much expanded, empiraically derived, body of general knowledge about the nature of information, and the character of the information in the transfer process ;

(iii)   an education that develops the capacity of the student to identify general principles that are relevant to specific problems of professional practice, to exercise sound judgement in modifying and adapting these to the needs of a particular environment or an individual client, and to accept responsibility for the consequences of exercising independent professional judgement, a learning environment that rewards, problem solvers and not answer producers ;

(iv) an education that prepares the individual to function effectively as a professional in an environment where basic assumptions may be subject to searching review, sweeping modification, or amy even be discarded in the light of changing conditions ;

(v) an education that lays foundation for life long independent learning.

In case sufficient attention is paid and these new developments in educational system take place, the Information Profession will be in a position to play its role more effectively and in a purposeful manner.

1.3.9 Information Society : Indian Scenario :

India is moving towards information society or not, to get the proper analysis about the fact, we shall have to go through problems as well as strength areas for transformation to information society.

Problems :

Some of the problem areas are as under :

(i)   Human Resources development

Inspite of availability of an adequate number of qualified manpower, India will required to retain a substantial part of its work force to make it work adaptable and in harmony with new WORK CULTURE.

(ii)   Information Literary :

In addition to the manpower problem, a real problem for country is that presently maximum citizen of India are not in position to participate and the benefits offered by I.T. Among them 60% requires re-education and training so to make use of resources offered by I.T.

(iii) Telecommunication and Power :

Beside information literary another hurdle is the telecommunication problems and power shortage.

(iv) Infrastructive :

In some of important institutions there are not adequate funds to acquire and arrangement the organizing suitability with computer system and communication facitlities. As there is a GAP between infrastructure have's and have not's with in the country.

(v) Adoption and Absorption technology :

Adoption and Absorption of technology shifting from non-electronic information system such as traditional library system, paper publishing system, to more modern and efficient electronic information system is not an easy task for a country like India. There have been strong protest workers in various sector where use of I.T. was installed.

Indicators of Information Society :

India is moving towards information society inspite of the problems. There are some accomplishments which if fully exploited may help the country to forge ahead to become information society. In view of large GNP (40%) accounted for information sector, some scholars suggest that India is making significant progress towards becoming information society.

India has set up silicon velley near Bangalore and some international companies have also established their units due to availability of cheap competent and qualified man power in India.

I.T. Taskforce Committee of India has recommended more internal service provides to boost up usage of internet in India and for creating more Indian contents on internet.

In India presently number of network that are running parallel to boost up information communication culture. The major ones are ERNET (Edcation and Research Network) NILNET and NIC. Government of India is a premier organization in the field of I.T. in India. In addition to these, there are number of other regional, local, international networking system like SIRNET, I-NET, INFLIBNET, DELNET, CALIBNET, BONET, MLIBNET DESINET, BTINET, etc.

In addition India has elite schools of engineering, namely IIT's besides some of other excellent institutions, which match the international standards in advanced engineering education and research.

1.3.10   Conclusions :

In recent decades, especially after the two world wars we notice that civilization has moved from industrial society to what is ofter referred to as a post industrial society. In this society, informaion is the predominant element than mere industry and much of labour force is working in this sector.

An Important feature of an information society is the rise in the number of white collar worker. Further the way decision making has considerably changed. The other most important feature is the use of modern technologies effectively and efficiently for various purposes.

In such society, CAPITAL alone does not ensure productivity, INFORMATION is the key economic resource, industries are thus becoming more BRAIN intensive than CAPITAL intensive.

Information impact on various sector of the society can be seen and observed that information is presently considered a resource. Its possession and exploitation has given birth to information society.

In the economic sector, information has already become a commodity and is being sold, purchased and exchanged in the market like other commodities, so the trend of marketing of Information has taken place.

In the information society, the information and library professionals will be that of consultant knowledge worker, information facilitators and information editor. They have to cope up with teh situations like information black out, information poverty, etc.

The successful nations and enterprises in future will be these that can make the best use of information. Therefore, Government of India appears to be keen on developing a sound information infrastructures through setting up NISSAT, NIC and library assistance provided though net work in various national centres of Information.

1.3.11. Self Check Exercise

> Q.1.   Name the different revolutions witnessed by the human society.

> Q.2.   Enumerate the characteristics of Information Society.

1.3.12. References :

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1.3.13. Answers for Self Check Exercise :

Q.1. Major Revolution are

    1. Agricultural Revolution

    2. Industrial Revolution

    3. Technological Revolution

    4. Information Revolution

Q.2. Main characteristics of Information sources are

    1. Economic character

    2. Technological character

    3. Social character

    4. Political Character.

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Information Communication
and Society
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LESSON NO. 1.4   **Author : Prof. (Dr.) Sewa Singh**

KNOWLEDGE : IMPACT AND IMPLICATIONS FOR LIBRARIES AND INFORMATION CENTRES

STRUCTURE

1.4.1. INTRODUCTION

Samuel Johnson once said, "Knowlege is of two kinds. We know a subject ourselves, or we know where we can find information upon it." It is the second kind of knowlege where the librarian or information professional is an expert. Francis Bacon had earlier said, "Knowledge itself is power." The famous Punjabi writer, late Amrita Pritam, in her novel *Akk De Patte* observed "Handover knowledge to someone before you go."

This is probably the *raison d'etra* of libraries as they exist for organizing knowledge and in the words of Shera, "Putting knowledge to work." For this librarians need to know :

(i)   the communication process and its role in the transmission of knowledge; and

(ii)   comprehension of human thought patterns so expressed that patterns of recourse to recorded knowledge can be derived from them.

It is here that librarians develop an effective mechanism of catalogues, indexes, abstracts, so as to develop a bibliographic connection between the user and the store of recorded knowledge. Only then we will be really "Putting knowledge to work."

1.4.2. Impact of Knowledge on Libraries

Libraries are considered as treasure house of knowledge. Libraries are also agencies for communication and distribution of knowledge. Knowledge is the

product of human mind as thoughts emerge in men's minds which he wants to share with others. Libraries have been helping him in this process.

1.4.2.1. Age of Manuscripts

More than five hundred years ago when printing was not done by machines, it was the age of manuscripts which used to be stored by the libraries. The number of library users was limited then, and the knowledge contained in the manuscripts was not exposed to the people at large. As a result the impact of knowledge on libraries was quite limited. The only visible impact was the care and preservation of the manuscripts for the posterity..

1.4.2.2. Age of Printing

With the advancement of printing and printing technology and availability of increased manufacturing facilities of paper, the number of printed books and periodicals started increasing at a pace faster than what was experienced earlier. The greater number of books and periodicals contributed to more and more knowledge contained in them. The impact of the increased knowledge led to the better arrangement of books and periodicals in libraries. Also, the number of readers in libraries started increasing as they were exposed to more knowledge.

1.4.2.3. Expansion of Education

Meanwhile education facilities started increasing with the setting up of more number of Schools, Colleges and Universities across the world. The expansion of education gave futher impetus to the community of readers. They started visiting the libraries and started maximum utilization of the available reading materials. On the other hand, the increased number of educated people, particularly those in academic institutions as well as social thinkers, started producing more books and periodicals containing new knowledge. As a result of the impact of knowledge on libraries, they further started refining their methods and techniques of organising knowledge.

1.4.2.4. Renaissance and Knowledge

The Renaissance, a period of transition from medieval to modern times was indicative of rebirth or revival of art and learning in Europe. This great movement of revivalism of culture and literature produced many great minds like Leonardo da Vinci, Michelangelo, Machiavelli, Montaigue, Maropolo, Copernicus, Francis Bacon, Shakespeare and the like. It was rightly called the 'Age of Genius'. This entire period of revivalism, spread over more than two centuries, was responsible for the growth of knowledge in its various manifestations like art, architecture, literature, humanities and science. It certainly had great impact on the growth and development of libraries of the times.

1.4.2.5. Reformation and Knowledge

The Reformation movement was a religious revolution in Western Europe. It began with Martin Luther when he stood against the then Church and gave an individual a greater sense of responsibility for salvation. It met with widespread acceptability. Religion took a new turn, and even corruption within the Church was mitigated considerably. It helped in producing new wave of religious knowledge.

1.4.2.6. Industrial Revolution and Knowledge

The socio-economic forces and the discoveries and inventions are the dynamic forces that contributed in revolutionising the social, political, cultural structure of the society and changing the outlook of the people. Many greatmen of this period played a prominent role in bringing the revolution and were responsible for the growth of knowledge. James Hargreaves, for example invented an improved spinning wheel which was, of course, further improved by Samuel Crompton. James Watt designed the steam engine thereby quickening the pace of Industrial Revolution in the late eighteenth and early nineteenth century. There was rapid development of industry through increasing use of machinery supplementing human labour. Economists like Adam Smith, Malthus, David Ricardo, and even Karl Marx studied the serious consequences of Industrial Revolution on the society. In this way this new revolution proved a great force in contributing to the growth of knowlege not only in science and technology but also in the social sciences, the impact of which had been deep on the libraries. The libraries now had to acquire more reading material and process the same for its dissemination.

1.4.3. CONSOLIDATION OF KNOWLEDGE

It was in the 19th century that consolidation and effective utilization of the knowledge of earlier periods was considered important. Industrially advanced countries made their best efforts to capture markets and wield authority on the under-developed countries. The scholars of this time included Karl Marx, Charles Darwin, Edward Jenner, Florence Nightingale, Louis Pasteur, John Dalton, Chorles Babbage, Curies (husband and wife), Edison, Bell and so on.

1.4.4. Growth of Knowledge in 20th Century

The 20th century has been marked with the all round development. The social development all over the world have been influencing the politics, economics, science policy, research and development, educational policy, future planning, international relations, foreign policy and so on. The pace of development of knowledge has been given a fillip with more and more persons engaged in research using powerful and sophisticated equipments.

The most outstanding contribution during the 20th century has been that of Albert Einstein in physics, Sigmund Freud in psycho-analysis, Bertrand Russell, G.E. Moore, etc. The three most prominent areas where the advances have been made include space, physical sciences and biology.

1.4.4.1. Evolution of New Subjects

As the knowledge grows there is increasing specialization in the subjects. Two processes are involved in this development.

1.4.4.2. Fission

It is the process of splitting of an existing subject into a number of narrower subjects. For example, the parent subject of librarianship has been split, as a result of fision, into library classification and cataloguing, information storage and retrieval information services and sources, library management and so on.

1.4.4.3. Fusion

It is the process that involves the merging of ideas from two or more parent subjects to form a new specialized subject. For example, the new subject of Biophysics is the result of the fusion of ideas from Biology with that from Physics. Similarly, biological ideas when merged with concept from Chemistry, produced a new subject of Bio-chemistry.

1.4.4.4. Increased Production

Kemp believed that as societies develop, their methods of production become more efficient that lead to the growth of knowledge. In a society there is a category of persons who is concerned with production; another class is concerned with the organization of production and distribution of the goods; and the third category indirectly concerned with them may be called 'thinkers'. It is this category that produces and increases knowledge.

1.4.4.5. Recorded Knowledge

The ability of man to record knowledge has contributed greatly to make entire social knowledge available for use. Without recording, each generation will be able to learn only from the previous one generation or perhaps two; and only what that generation(s) knew and remembered. Without recording much knowledge would be lost. Thus recorded knowledge in the form of documents is much more readily available than are particular people. It is therefore easily possible to acquire through documents, a greater number of ideas than through personal contact.

1.4.4.6. Pattern of Growth of Knowledge

The general pattern of growth of knowledge that is quite commonly emerging from the various measurements, is what is called as exponential growth. The exponential pattern of growth means that it will double not once but

frequently.

Knowledge also grows by a cumulative process. It implies that new knowledge is dependent upon that already in existence, and thus new knowledge is gradually accumulated.

1.4.5. Implications for Libraries

Wtih the growth and development of knowlege, libraries started developing, though gradually, as a social institution of the people, for the people, by the people. Libraries have been functioning to facilitate the communication of social knowledge for such uses as research, educational, cultural and for entertainment.

In the twentieth century, the library has occupied a key position with a solid base in the society. It spread its wings even to government organizations, in industrial units, in commerce and business sector, in research institutions, and so on. The modern libraries, as a result are divided into several categories based on the nature of information disseminated by them, nature of their readership, nature and type of documents they deal with. These categories are known as public, academic and special libraries.

1.4.5.1. Functions of Libraries

Modern libraries generally perform the following functions :

1.4.5.1.1. Acquisition : It is the function of actually obtaining the documents containing knowledge from the various sources. It implies, however, the process of selection of documents which are to be acquired.

1.4.5.1.2. Preservation : It means ensuring the documents and the knowledge which they contain continue to exist. Preservation of documents is done in order to serve the posterity, and transfer the cumulative wisdom of the past to the future generations.

1.4.5.1.3. Organization : This function, generally implies the physical arrangement of the documents by the methods of classification and cataloguing of these documents containing ideas or knowledge, so that the documents themselves and the knowledge can be found later. These need to be organized more carefully.

1.4.5.1.4. Dissemination : The function of dissemination involves informing users and potential users of the documents and the knowledge and the promotion of their use. It is therefore important to select which documents or information are disseminated to which clients.

1.4.6. Implications of Growth of Knowledge

The growth of knowledge as discussed in the preceeding pages has at least the following implications for libraries.

1.4.6.1. Storage

One of the important implications of growth of knowledge is the problem of storage, i.e. how and where to stack it all. The space in the libraries is always inelastic; while the containers of the knowledge, i.e. documents, always continue to grow, and continue to be acquired in libraries making the storage problems insoluble.

1.4.6.2. Selection

Selection of documents becomes both according to Kemp, more imperative and more difficult. There is always a larger mass of knowledge, but individual libraries have to make a selection of only a small proportion of it as they can neither afford financially nor can store them physically.

1.4.6.3. Cooperation

As a consequence of the above mentioned two implications, the third implication is the ricutation toward cooperation on the local, regional, national and international level. In such cooperative activities, the advantage goes in favour of the individual libraries as they no longer are islands in themselves. They have now become part of the larger systems.This takes the form of sharing responsibilities of various types including that of sharing the reading materials with the libraries in the system.

1.4.6.4. Change in Organization of Knowledge

Growth of knowledge being exponential, the amount of change is also big. This change could be even as a result of the fusion of two distinct areas of knowlege. This would call for change in the way the material is organized in the libraries on such subjects. Even the methods devised for organizing knowledge in the beginning of the libraries considered good, are now likely to be changed to be more helpful in new situations.

Further, it has direct implication for the general classification systems being followed for organizing knowledge in libraries. There is every possibility for their frequent revisions to accommodate the growth and change in knowledge or ideas. We already know about the revisions of such classification systems as Dewey Decimal Classification, Universal Decimal Classification etc.

1.4.6.5. Effect of Environment

Kemp believes that knowledge being different in different environments, it has its implications for the libraries. As libraries serve different communities, the organization of knowledge should also be different in those different environments. This, he believes, is the same ideas as that put forward by Bliss as the principle of "relative classification".

1.4.6.6. Complex and Difficult

The fast growth of knowledge also becomes more and more complex. The implication is that it gives rise to the problem of organizing knowledge not only in increased quantities, but also of dealing with a more complex structure as a result of multifaceted growth.

1.4.7. IMPLICATION FOR INFORMATION CENTRES

Today, information is considered of great importance in the lives of all mankind. All our economic and social progress depends on the transfer of scientific and technical information. People in different situations require information on a subject in different forms and with different emphasis and different depths of explanation. Information today is called power, a resource, an asset.

1.4.7.1. Changing Role

In order to encourage the use of libraries, and increase their participation in teaching and research programmes of the educational institutions, the libraries gradually became the nucleous of intellectual gravity. The library professionals became more aware of the new responsibilities of active side of information. They changed their roles as follows :

    (i)   Providing information pin-pointedly, exhaustively and expeditiously;

    (ii)   Answering factual and complex reference questions by literature searching;

    (iii)   Compiling bibliographies, and making annotations;

    (iv)   Preparing indexing and abstracting services;

    (v)   Maintaining of information and other files; and so on.

Now, libraries were faced with the onslaught of intellectual challenges thrown by the explosion and proliferation of knowledge. They started sharpening their techniques of information storage and retrieval for the prompt-dissemination of right information to the right user, at the right time, in the right form and in the right amount. The new techniques devised by them included the techniques of documentation, indexing systems, information storage and retrieval, methods of disscriminating current awareness services, selective dissemination of information, compiling subject bibliographies, conducting state-of-the-art reviews, preparing various types of abstracts, preparing technical digests and so on.

1.4.7.2. Shift from the Traditional Tools

The new libraries are now called information centres established in the research, scientific and technical institutions, where the emphasis shifted from the macro to micro documents. The focus of users as well as of the

information professionals was information rather than books and periodicals.

1.4.7.2.1. From Catalogue to OPAC : A catalogue is a list of the materials in a library, with entries representing the items arranged in either alphabetical order or classified order. Today, many catalogues are held as computer databases, when they are known as Online Public Access Catalogues (OPACs). As an implication on information centre the shift took place from manual to online searching of the library records. OPACs have provided many facilities to users who can develop a search strategy in one window, call up a thesaurus display in another window, and consult help, or view the results of their search in yet another window.

1.4.7.2.2. From Human Perspective to Machine Perspective : So for information search has been conducted, either known items searching or subject searching, by two methods. Rowley states that the first kind of search is user-conducted where the documents or resources are set out in such a way that users can retrieve information for themselves. In the second kind, information professional serves as an intermediary to carry out the search on behalf of the end-user.

From this human perspective, the shift has been to machine perspective where the approach to retrieval is from the point of view of the way information is processed. In the machine can be used the citation indexing, hypertext links, information filtering, image and sound processing.

1.4.7.3. From Manual Information Retrieval Systems to Computerized

This is result of another important implication of the new environment as a consequence of the growth of the knowledge and its organization by means of information technologies. The shift from manual systems to computerized ones has afforded greater accessibility, currency, more dynamic information, more access points, change in search output.

1.4.7.4. Change in Format of Documents

A document can be defined as a record of knowledge, information or data, or a creative expression. This was true when documents were normally text based. As a result of the impact of the growth of knowledge on the one hand, and increased application of information and communication technology, documents are being produced in new formats where not only optical appratus like slides, microforms etc. have been with us but electronically readable formats have also reached the libraries and information centres.

There has been growth of electronic documents having their own implications, features and problems.

1.4.7.5. Library and Information Networks

Libraries have a long history of collaboration in their efforts to organize

knowledge. In recent years the application of computers to library and information centres and use of Internet has offered an infrastructure for information exchange. They have formed networks which comprise users, libraries, national libraries, information centres, publishers and a range of other agencies in the information industry. These networks provide for exchange of, or provision of access to, a range of databases and document types like e-journals, CD-ROM documents and so on. The ultimate aim of most networking is to make documents, information or knowledge accessible to the end-user.

In India some such networks being supported include INFLIBNET, DELNET, CALIBNET, BONET, PUNENET, MALIBNET and so on. Similarly, there is a long list of networks at the international level.

1.4.7.6. Consortia

Consortia are another venture of co-operation among libraries and information centres at local, regional, national and international levels. In India many examples of such consortia are non-available, and INDEST is one of them. The groups of libraries participating in these ventures feel that they and their users can be benefitted by resource-sharing and document delivery.

1.4.8. SUMMARY

Libraries deal with knowledge created by society and attempt to serve the same to people so that they can use it. Describes the growth of knowledge from the manuscript age to the present times and identifies various factors responsible for growth stating the impact on the growth and development of libraries. The 20th century saw the consolidation as well as intensification of knowledge alongwith specialization and growth of new subjects. Discusses the implications of knowledge for libraries in view of their functions, organization of recorded knowledge, the library services. Also states the development of information centres as a result of shift of emphasis from macro documents to micro-documents and information. This made these centres to shift from the traditional tools of knowlege organization to the modern ones to the development of networks and consortia.

1.4.9. SELF-CHECK EXERCISES

1.   State how librarians put knowledge to work.
2.   Discuss the growth of knowledge from the ancient to the modern times.
3.   Identify the various factors of growth of knowledge.
4.   Mention how new subjects developed in the 20th century?
5.   Describe the implications of knowledge for libraries.
6.   Mention the functions of libraries and information centres.
7.   State the implications of knowledge for information centres.

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LESSON NO. 1.5   **AUTHOR : DR. SEWA SINGH**

Communication Channels and Barriers

Structure

1.5.1. Introduction

Communication is a social phenomena, so it is important to society. It has passed through many phases. Beginning with verbal communication, to written communication, through era of printing, to the age of telecommunication, and further to interactive communication.

Communication being a process, it involves the exchange of ideas, messages, feelings, etc. thereby giving satisfaction to both the source and the receiver.

1.5.2. Concept of Communication

The word communication means *share,* and when two people are communicating, they are sharing some information, or ideas, feelings, actions, etc.

According to the *Oxford English Dictionary[1]* communication is "the imparting, conveying or exchanging of ideas and knowledge whether by speech, writing or signs."

According to Rodrigues[2], "Communication is an exchange and exact replication of thoughts, feelings, facts, beliefs and ideas between and among the individuals through a common system of symbols to cause some action or change in behaviour.

Shera[3], while quoting Marler, regarded communication as being essentially "the evolution of synergistic interplay between participants both of whom are committed to maximizing the efficiency of interchange." Thus it can very well be said that no man, indeed, is an island entire of itself.

The more commonly understood meaning of communication refers to anything from face-to-face conversation between two persons, to conversation over the telephone, to correspondence between friends.

Communication, in this way, can be stated to be a complex activity. In our daily life we talk, listen, read, write, watch television, or listen to the radio, etc. without being much aware of its complexity.

1.5.3. Development of Communication

In the ancient times, man used to acquire information and knowledge through his five senses, i.e., eyes, ears, tongue, nose and skin. These sources also helped man to communicate his ideas, feelings, etc. with the fellow beings.

He used body language or sign language for communicating. It can perhaps be considered as the earliest form of communication.

Then came the pictorial representation of ideas as a mode of communication. The ancient man also used smoke signals, drum beats, etc. to send signals at a distance.

The invention of writing and alphabet was developed from the pictures and helped greatly in the communication process.

The inventions of paper and printing had tremendous impact on the development of communication, as it enabled the record of the information to be stored. The development of books and periodicals from the manuscripts was a big leap forward in this direction.

Then came the telephone which enabled people to communicate over a long distance. Mail service, on the other hand helped in communicating the written messages. Even today these are common methods of communicating information.

During the last 50 years or so the development of electronic communication modes such as telex, fax, internet, etc. have greatly facilitated the communication process in the 20th and 21st centuries.

The impact of the growth of science and technological innovations on the development of communication has been immense. The development of broadcasting, motion pictures, television, etc. led to the cultural innovations that allowed efficient and rapid communication between a few individuals as well as the society at large. This contributed to the new social power called mass communication. And now, as a result of high speed communication not only voice but text, data and images are also being communicated making the man powerful.

1.5.4. Types of Communication

Some of the types of communication system may be identified as follows :

1.5.4.1. Non-vocal Communication

It refers to the use of signs, signals, symbols, etc. used in the total communication process, coming down to us through centuries. In our daily lives, we use many signs such as pictures, drawings, works & arts, traffic signs; while signals could be in the form of smoke, drum beats, etc. transferring energy constantly. Though difficult to define, body language could be form of symbol through which humans have been

communicating since ages. Moreover, it is universal in its gestures.

1.5.4.2. Vocal Communication

It is based on spoken languages. It makes use of man's vocal chord for communicating ideas expressed in a language having a huge store of vocabulary, sometimes beyond complete comprehension. Thus it provides immense possibilities of human communication.

1.5.4.3. Non-verbal Communication

Such communication is effected through gestures, facial expressions, instrumental music, touch and the like.

1.5.4.4. Verbal Communication

With the development of language the age of verbal communication among people started. They make use of the words in a language while speaking and writing and transfer information from one person to another. A thought expressed in one language can also be translated into another language without the loss of meaning.

1.5.4.5. Intrapersonal Communication

Man must communicate both with himself and with his fellows. He could be talking to himself, reading for himself, i.e., limited to one person. He makes use of such elements of communication as a transmitter, receptor, medium and message.

1.5.4.6. Interpersonal Communication

Here man communicates with his fellows among two or more individuals. It could be face-to-face or at a distance with the help of letters, telephone, fax, e-mail, etc. However, it makes use of the same elements of communication as those used in intrapersonal communication.

1.5.4.7. Group Communication

It presupposes the existence of an organized group, small or large. Here the roles of speaker and listeners are shifted among the participants of the group.

1.5.4.8. Mass Communication

It indicates the use of mass media, such as print media, broadcasting, or non-electronic media, for communicating thought from one person or a group to the public at large. Here, the relationship between the source and the target is different from that in interpersonal communication.
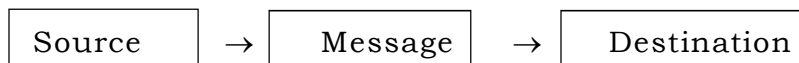
1.5.5. Communication Process

1.5.5.1. Elements

There are three basic elements—the source, the message and the destination—in the communication process.

1.5.5.1.1. Source : It is the starting point in the communication process. A source could be a person or an institution.

1.5.5.1.2. Message : It is the meaningful representation of the original thought of the source. It could thus be in the form of written, or printed text, sound waves, light waves, impulses in the electric current, etc. It could, however, also be in the non-verbal form of signs, symbols, gestures, etc.

1.5.5.1.3. Destination : It is the target of the message. Destination is the recipient who could be an individual, or a group. The message is transferred to the destination through print, audio, or/and video medium.

| Source | $\rightarrow$ | Message | $\rightarrow$ | Destination |

Basic Elements of Communication Process

1.5.6. Channels of Communication

A channel is also called a medium. It is through the channel (or medium) of communication that the information is transferred to the destination or receiver. According to S. Parathasarathy there are two types of channels of communication. These are : (1) Informal Channels, and (2) Formal Channels. A discussion about these two types is given below :

1.5.6.1. Informal Channels

Generally these are oral, and the dissemination of information is also limited to a small group of people. Informal communication is sometimes referred to as *interactive,* as it involves a direct interaction between the source and the recipient.

1.5.6.1.1. Person-to-Person : Being selective in nature, oral

communication is restricted to person to person, for instance, a talk face-to-face or by telephone.

1.5.6.1.2.   Person-to-Group : Here it is limited to a small group meeting, or a committee meeting.

1.5.6.1.3. One Person to Many : It could be a speech delivered by a person to many fellow workers, or scientists in the same field.

1.5.6.1.4. Several Persons to Several Persons : It includes such events like group discussion, conversation, etc.

1.5.6.1.5.   Informal Channels, besides being oral, can also be documentary. The distribution of such documents is very selective to a small group of scientists working in the same lab or in the same research area. The subject interest group is generally kept informed as the research work progresses. It makes the distribution of information quite fast.

1.5.6.1.5.1.   Correspondence : It is personal communication with external and internal scientists.

1.5.6.1.5.2. Published Documents : These include journal articles, books, pamphlets, specifications, data compilations, graphics, etc.

1.5.6.1.5.3.   Unpublished Documents : These includes thesis, circulars, reports, etc.

1.5.6.2. Formal Channels

Formal communication generally makes use of the documentary channels. With their help one can communicate to a large section of the society. These channels are, however, *non-interactive* in comparison to informal channels. These are discussed in brief.

1.5.6.2.1. Newspapers : These are generally read by general public as they provide information useful for almost everybody. These are published on daily basis, sometimes weekly also, their news-value is high. They interpret events behind the news, give analysis of social and political developments, as well as information about stock market, sports, etc. Thus these are cheapest and most popular source of reading and entertainment.

1.5.6.2.2. Magazines : These are also popular kind of reading material among various sections of the society. Magazines are published regularly

on weekly, fortnightly, monthly basis. These are published on better quality paper with many colour photographs and other illustrations making them more attractive. They do not provide daily events information but give better analysis and interpretation of a variety of topics. However, these are some magazines having special target group, e.g., Femina, Women's Era, Grehshobha (for women); while some others cover special topics. e.g., Computer Today.

1.5.6.2.3.   Learned Periodicals : These are specialized subject journals, and therefore are not meant for general public. These are called primary sources of information reporting original research of scientists, academicians, etc. Articles in these periodicals are the main channels of exchange and communication of information in different subject areas. Their basic purpose is educational and research. These are generally published on quarterly, half-yearly basis.

1.5.6.2.4.   Books : Books as channels of communication are most beautiful items which last much longer than many other channels. They are capable to provide information, inspiration, entertainment to their users. However, books do not generally contain the latest and up-to-date information as it takes one to two years to produce them. There are many types of books available in the market as well as in libraries, like text books, reference books, research monographs, fiction, and so on.

1.5.6.2.5. Conference Proceedings : This is another useful channel targeting a specialized audience. At conference and seminar meetings research papers on a theme and its facets are presented and are subsequently published in book form.

1.5.6.2.6. Indexing and Abstracting Periodicals : These are called as secondary sources of information, and are based on the primary sources. They provide information to researchers about where to find information from sources like periodicals, books, etc.

1.5.6.2.7.   Similarly, there are many more such documentary channels as directions, gazetteers, atlases, etc.

The above described channels may also be referred as print media and are quite powerful communication channels.

There are some other channels based on electronic media and are more fast than the print media. Some of these are given below.

1.5.6.2.8. Telegraph : With the invention of telegraph in the early 19th century, the era of modern communication started. But it was still a laborious and slow method of transferring information. The keys were further improved in the start of the 20th century and it became like typewriter keyboard. The message is reproduced at the receiving with the help of a special output unit in readable characters.

1.5.6.2.9. Telephone : It is one of the largest established methods of electronic information transfer. The development of telephone provided a solution to the technological problem of converting the sound patterns into electrical patterns. These patterns are carried over the wire. The development of the concept of multiplexing has further in transferring different signals at the same time. It has afforded the possibility of one-to-one talking and communicating information to the other end irrespective of the distance.

1.5.6.2.10. Broadcasting Media : It begins the wireless era. It includes such mass communication devices as Radio and Television. These have made possible long-distance message transmission between the sources and the receiver without the use of wire. The message is transferred in the form of energy waves in the electromagnetic spectrum. These media have helped to communicate to a large audience over long distance from radio and television centres.

In recent years the development of the use of satellite communication systems in the broadcasting media have now been providing worldwide television network linking almost every country of the world.

1.5.6.2.11. Electronic Mail : It has been developed as an alternative to the conventional postal mail service. Here the message is transferred in electronic form. The transmission takes place through a telecommunications network. Electronic-Mail (E-mail) system works via a video terminal, or a word processor with printer, a fax machine or any data terminal including computer vision and voice communication systems. It is a complex system encompassing such technologies as fax transmission, telex, videotex, etc. It has reduced the time delay in communicating information from source to receiver as the mail reaches in minutes.

1.5.6.2.12. Videotext and Teletext : Videotext is delivered by wire. A

person can ask for information from a central computer for delivery over telephone or cable television lines. On the other hand, teletext is delivered over the air. Teletext enables the users to view the frames of information on request already being transmitted but invisible on their television screen.

These communication channels have helped to bring the powers of computer to the home television.

1.5.6.2.13. Computer Communication : An electronic computer is a digital communication device. Microcomputer-based communication includes computer conferencing, database searching, etc. Now computer networks are used for communication between a number of computers as also between a computer and many terminals. In this way the information is transferred to distant users making use of radio, microwave, light or electronic current links through optical fibers or space.

1.5.6.2.14. Cable T.V. System : It is a wired communication system of high capacity. The information or message starts from a central source via distribution cable to neighbourhood lines, and then into the house. A cable T.V. system can include many communication signals of text, music, and other information.

1.5.6.2.15. Library as a Communication Channel : A library not only stores and organises information but also disseminates it to its users. A library and information centre makes all efforts to disseminate information stored in documents. With the help of various bibliographical and information services, such as Current Awareness Service (CAS), Selective Dissemination of Information (SDI), indexing and abstracting services, library transfers information to users. In recent years the modern information technology has been applied to library activities. It has helped libraries to provide qualitative services more efficiently. With the developments in telecommunications, computers and networks the operations of libraries and information centres are undergoing change for disseminating information to a wide range of users.

1.5.7. Barriers to Information Communication

Some of the barriers to communication can be identified as follows :

1.5.7.1. Institutional Barriers

In institutions information generally flows among equals. Being a two-

way process, while providing information to others, one also expects some useful information in exchange. For staff of lower status it is not easy to enter into such networks of information.

Again, institutions being in the hierarchical structure more of information flows from persons of lower ranks upward to the top management where decisions are taken. All information at the top is not transferred to the bottom.

Secrecy of information is another impediment in free flow of information in institutions.

1.5.7.2. Financial Barriers

These barriers contribute to increasing the cost of informations. Funds are always limited, and their inadequacy is a barrier in information communication.

Every year the cost of production of sources of information increases to the extent that the purchasing power is reduced considerably. On the other hand the budgets of libraries are also reducing. As a result, libraries are not able to purchase documents needed by their users.

Again, due to financial difficulties, scientists may not be able to conduct research properly, or may not be able to participate in the seminars and conferences to report the findings of their work.

1.5.7.3. Language Barriers

Language is considered as "the most momentous, and at the same time the most mysterious, product of human mind." Further, language is a purely human and non-instinctive method of communicating. However, not only there are imperfections in a language, but lack of knowledge about other languages is a major barrier in information communication. Thus, a foreign language not understood by the scientists and other users acts as a hinderance. This gave rise to translation services at local, national and international levels. Information centres at national and international level are maintaining Panels of Translators for the benefit of the scientists. In India NISCAIR, New Delhi has a Russian Science Information Centre which provides English translations of Russian literature on demand.

1.5.7.4. Technical Barriers

The technical writing has a key role in communication of information. If

the information product is not well written many impediments come in the way of effective communication. Bad style of writing with poor presentation of information does not hold the attention of readers. Some common problems associated with style of presentation may be ambiguity of language terms, less details, repetition of old information, lack of abstract, references, appendices, illustrations, etc.

1.5.7.5. Psychological Barriers

The receivers of information, on their part, have developed a number of psychological complexities. These stand in the way of effective communication of information. Some of these could be unwillingness to changes, unhappiness over discipline, shyness, self-consciousness, ignorance, mistrust, prestige, etc.

1.5.7.6. Social Barriers

There are always differences in ideologies of scientists and other scholars which could lead to social barriers in information communication. The citizens' right to freedom of opinion, their right to access information could also sometimes come in the way of free flow and exchange of information.

1.5.7.7. Political Barriers

Diplomatic relations between the countries also regulate the communication of information. A country not having good diplomatic relations, for certain political reasons, with another country may not allow its scientists to transfer information with his fellow scientists in this country.

1.5.7.8. Administrative Barriers

Some institutions or organizations have imposed certain restrictions with regard to flow of information on their scientists and researchers. These administrative barriers could be because of the policy of these institutions or for certain other reasons.

1.5.7.9. Procedural Barriers

Sometimes procedural difficulties stand in the way of acquiring and communicating information. Occasionally, procedures involved in the process of acquiring information are so cumbersome and disgusting that the researchers or scientists may give it up half way.

1.5.7.10. Ignorance

Another significant barriers in the communications of information is the

ignorance about and inability to use the opportunities offered by information services rendered by the various information centres and libraries.

1.5.8. Improving Information Communication

In order to overcome the above stated barriers in information communication the role of individuals as well as that of organizations becomes important. The following aspects may be taken into consideration for this purpose :

1.5.8.1. Familiarity with Technical Writing

For better communication it is essential that every scientist has adequate knowledge of technical writing for writing good papers. A well-written paper helps in the better exchange of information among scientists.

1.5.8.2. Adequate Equipments

In order to make communication of scientific information an integral part of scientific research, equipment needed for the production of good communication should be given due importance. It is desired that the research centres should be equipped with modern facilities like word-processors, electronic typewriters, and equipment for preparing quality illustrations, etc.

1.5.8.3. Standard Style Manuals

The main purpose of style manuals in to serve as essential tools for the scientific workers and other authors enabling them to write texts that conform to internationally accepted standards in all respects. By making these standards available as well as popular the communication of information will be facilitated.

1.5.8.4. Editing

Some experts strongly believe that editing is an important part of writing and publishing process. In editing process, the style, format, spelling, grammar, etc. are checked carefully. However, the editor (a) should be a specialist in the field of investigation covered in the paper, (b) should have been engaged in research in the field recently, (c) should himself be a research worker of high standing, and (d) should not be excessively busy with other responsibilities.

1.5.9. Role of Library

There are many agencies that promote the communication of information. These include authors, publishers, libraries, information analysis centres, information networks, universities, learned societies, government, book trade, etc.

Libraries not only are called as treasure house of knowledge, they also play important role in disseminating information to a wide variety of users. Libraries organise various types of bibliographical and documentation services such as reference service, current awareness service, selective dissemination of information, reprographic services, translation services, etc. These are other services help greatly in the promotion of communication of information.

Libraries and information centres also being out, from time to time, various information products. These include bulletins, indexing periodicals, abstracting periodicals, local documentation lists, machine-readable files. By marketing these and other information products libraries further promote the powers of information communication. And now with the establishment of library and information net works such as Infliblnet, Calibnet, Delnet, Sirnet, etc. the exchange of information on a regular and organized basis has been immensely facilitated.

1.5.10. Summary

Communication is defined as a process for transmitting message. Outlines the development of communication from the ancient times to the present era. States that communication could be vocal, non-vocal, verbal, non-verbal, intrapersonal, interpersonal, group and mass communication. Describes various elements of communication process. Various types of channels of communication are explained including formal and informal channels. Discusses various types of barriers in the free flow of information, and how to overcome these barriers so that communication of information is improved. States that library and information centres are vital components in the information communication chain in the modern times.

1.5.11. Self Check Exercises

1. Define communication. Discuss its development in historical perspective.

2. Identify different types of communication, giving suitable examples.

3. Enumerate the basic elements of a communication process.

4. Describe in detail various channels of communication.

5. Discuss the various barriers to the communication of information.

6. Explain how the barriers to the communication of information can be overcome.

7. Point out the role of libraries in communication chain.

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LESSON NO. 1.6	**AUTHOR : DR. SEWA SINGH**

Information Management and Knowledge Management

Structure

1.6.1. Introduction

Knowledge, in the present age of information, has come to be recognized as the most important factor in the success of both an individual and an organization. Knowledge is also becoming increasingly important in the education and service sector, therefore it is significant to manage the knowledge base and manage its storage and use.

1.6.2. Knowledge

Knowledge is considered as the totality of all existing information that is known. Every piece of information that is recorded in logical and systematic manner creates knowledge. According to Gray "Knowledge is the full utilization of information and data, coupled with the potential of people's skills, competencies, ideas, intuition, commitments and motivations."

According to *Webster's New Collegiate Dictionary,* Knowledge is defined as "the fact or condition of knowing something with familiarity gained through experience or association." S.R. Ranganathan said that knowledge is "the totality of the ideas conserved by the humans."

1.6.3. Types of Knowledge

There are two distinct types of knowledge :

1.6.3.1. Explicit Knowledge

It is that type of knowledge which is written and recorded in tangible form. It is documented knowledge like books, journals, patents, databases, manuals, etc. When we refer to knowledge, mostly we tend to think of this recorded knowledge.

1.6.3.2. Tacit Knowledge

This type of knowledge is more important and value adding as it has competitive advantage. It is communicated through observation, conservation, on-the-job learning, and so on. It is therefore embedded in the minds of people. The tacit knowledge is intuitive, contextual, linked to experience, past memories, and difficult to codify, document and communicate. Since it is difficult to identify, quantify, and convert into real value, this intangible characteristic makes its management a challenge.

1.6.4. Information Management

1.6.4.1. Definition

The basic building block of knowledge is data. Data is a fact represented as an item or event. But information adds context through relationship between data and other information. Data with metadata and context makes information. Davis and Olson define information "as a data that has been processed into a form that is meaningful to the recipients and is of real or perceived value in current or prospective actions or decisions."

In today's knowledge based society all the organizations and people are engaged in information management and organization of knowledge. It can be achieved through information processing, information management and knowledge management.

All the objectives of libraries and information centres concerning to collect, organize, process and disseminate information to people and organizations are concerned with information management.

According to *Harrod's Librarians' Glossary,* information management (IM) "is becoming the most generally accepted term for a range of information-related activities. Broadly, it covers all aspects of the production, coordination, storage, retrieval and dissemination of information-regardless of format or source and suggests and organizational aspect that will impart some degree of added value to information. The shift towards acceptance of the term in a wider context is due to its increasing use as a parallel with librarianship, implying that the traditional skills of the librarian and those of the IM professional are related. The term was initially used in the corporate context but has spread into mainstream areas of librarianship. The grouping role of end users in finding arranging their own information via the Internet and intranets has given further impetus to this term.........."

1.6.4.2. Processes of Information Management (IM)

Fairer-Wessels has identified some of the processes involved in IM. According to him IM is viewed as the planning, organising, directing and controlling of the information within an open system. Information Management is viewed as using technology, information systems, IT and techniques effectively and efficiently to manage information

resources...to enhance proactive decision-making and problem solving to achieve aims and objectives on a personal, operational, organisational and strategic level of the organisation for competitive advantage and to improve the performance of the system and to raise the quality of life of the individual.

It is clear from the above that information is the life blood of the people as well as organizations in their decision-making. The library and information professionals have been successfully processing the available information with the help of available modern technologies.

1.6.5. Knowledge Management

1.6.5.1. Definitions

In order to achieve the objectives of the organization, it need not only to gain access to all available information, but other knowledge assets for which are strategic capital. So why knowledge is powerful, and it needs to be managed. Knowledge Management (KM) therefore is defined as the art of creating value from an organization's intangible assets. *Harrod's Librarians' Glossary* defines KM as 'The process of collecting, organizing, storing and exploiting the information and data that is held within an organization, particularly information known to individuals (tacit knowledge), as well as the general store of known information and data (explicit knowledge)."

Similarly, Susan an Norman held the view that KM is "accessing, evaluating, managing, organising, filtering, and distributing information in a manner that is useful to end users.........knowledge management involves blending a company's internal and external information and turning it into actionable knowledge via a technology platform." According to Peter Drucker and Jame Quinn : "Knowledge Management is a process of a question of proper vision, organization networks, educated decisions and the best use of lessons learnt as the key of organization learning." Thus KM has many definitions, but no universally accepted definition. KM is a cross-disciplinary domains wherein experts from different subject areas will be taking keen interest in it. It is generally heralded as the next 'age' or revolution in businesses and organizations, and sometimes seen as a discipline in itself.

1.6.5.2. Functions of KM

Carl Frappaolo has stated that there are four basic functions of KM. These are externalization, internalization, intermediation and cognition. These are explained as below :

1.6.5.2.1. Externalization : It is capturing knowledge in an external repository and organizing it according to a classification system. Technologies like imaging systems, databases, etc. are used to capture knowledge and store it online. Powerful search tools are used to identify similarities among separate information sources.

1.6.5.2.2. Internalization : It is extracting knowledge from the external repository and filtering it to identify the relevant one according to the needs of the knowledge seeker. The extracted knowledge is reformatted and presented to the seeker in the most suitable manner, by improving knowledge access.

1.6.5.2.3. Intermediation : It focuses on the transfer of tacit knowledge. It links the people needing information in some specific subject with the people who possess knowledge in that area. Intermediation is automated through technologies such as Group Ware, Intranets, Workflow and document management systems.

1.6.5.2.4. Cognition : It is the application of knowledge that has been gained through the above mentioned three functions. It is the ultimate goal of management. The process of cognition is automated by using Expert System or some component of Artificial Intelligence.

1.6.6. Information Management and Knowledge Management

The difference between IM and KM can be based on a conceptual distinction between their respective objects, i.e., information and knowledge. But in our daily life we often use information and knowledge interchangeably. However, information is a tangible representation of data or knowledge within a specific context. Here, the success factor is effectiveness of representation in communicating the information. Knowledge, on the other hand, is information in the context of an individual's role, learning behaviour, and experiences. Here, the success factor is the congruity between the information and the individual's perspective.

While trying to differentiate between the two concepts, it can be stated

that KM involves not only all activities of IM, but some more specialised activities centred on creation and recording of new knowledge and sharing it also.

In this context Gartner observed that 'Knowledge management enables individuals and collaborative groups to identify, capture and share information, while information management uses specialised IT staff to identify, capture and process information." But IM basically deals with information present in the documents, while KM not only deals with the information in the documents but also with the knowledge present in the brain of people working in an organization.

In IM, coded information becomes knowledge for future use, while in KM, coded knowledge (explicit knowledge) becomes information for future knowledge base.

The challenge for IM lies in valuing separate information items and demonstrates the power of IM in the context of profit margins, increased organizational efficiency, etc. The challenge for KM lies in tapping the tacit knowledge and create an environment that would facilitate creation and sharing of new knowledge. Thus KM is team-enabling management style.

1.6.7. Role of Libraries and Information Centres in KM

In view of importance of knowledge to human society it has to be collected, captured, and selected. Once knowledge has been selected, it need to be organized and represented for strange and retrieval. Many scholars and academicians are involved with knowledge for learning, conversion of tacit knowledge into explicit knowledge and share for evaluation and further research in their respective fields.

Libraries and information centres play important role in storage of thus created knowledge in different domains. They further play significant role in disseminating information and knowledge to meet the varying needs of academicians.

In recent times libraries and information centres are moving towards digital environment as a result of the changing needs of user community as well as the impact of IT application. The physical format of knowledge carriers is changing fast from the traditional books and journals to databases, textbases, World-Wide Web, e-journals, e-books, etc.

In changing scenario the effectiveness of libraries and information

centres lies not only in the provision of the required information but also in the knowledge about related resources, skills, and technologies involved in it.

The role of information professionals in such a scenario is bound to change. They will have to be more systematic in trading existing organisational strengths and this is likely to lead to developing new information resources relating to the expertise available in the organization. Such efforts can save money as well as time that could have gone waste otherwise.

1.6.8. Role of Databases and Networks in KM

KM requires an environment in which both technology and people need to be used as complementary to each other. People are needed to understand knowledge, to interpret it in broader context, to relate it with other types of information, and to synthesize various unstructured forms of knowledge. Computers and communication systems, on the other hand, help greatly in capturing, transferring, distributing structured knowledge. Databases of knowledge in the form of text, data, images, charts, tables, etc. are knowledge repositories when put online. With computerized networks available around the globe knowledge in quickly retrieved, made available and accessible to the user community. Networks have further facilitated sharing of knowledge, and would strengthen the knowledge perspective of the organization.

Databases and networks are helping to improve KM as a tool to ultimately improve library effectiveness and play a larger role in the organization and for the people in general.

It can, however, be stated that the information professionals can find a new focus within the organization in view of the impact of KM. They should be made part of the team devoted to acquiring external information of value to organizational perspective. They should also accordingly, improve their skills and competence by way of acquiring requisite knowledge of IT so as to be able to tap all types of knowledge.

1.6.9.   Role of Gateways and Portals in KM

1.6.9.1   What is a Poartal

The Oxford Reference Dictionary defines a portal as 'a doorway or gate, etc.

especially a large or elaborate one'. Thus portal and gateway is the same. Similarly, the current edition of the **American Heritage Dictionary of the English Language (2003)** available online offers this definition of a portal, 'website considered as an entry print to other websites, often by being or providing access to a search engine'. However, some experts believe that the word 'portal', in a technology sense, is overused and difficult to define.

1.6.9.2 Coverage of Portals

Portals cover a wide range of topics and interest areas as given below :

i. There are government portals;

ii. Science portals;

iii. Environmental portals;

iv. Community portals;

v. portals relating to IT industry;

vi. education portals;

vii. portals relating to libraries, music, sport, health, and so on.

1.6.9.3 Web Portal : Meaning

A web portal is a special internet (on intranet) site designed to act as a gateway to give access to other sites. A portal aggregates information from a variety of sources and makes that information available to various users. In other words, states Arthur Tatnell, 'a portal is an all-in-one web site used to find and to gain access to other sites, but also one that provides the services of a guide that can help to protect the user from the chaos of the internet and direct them towards an eventual goal.' From this statement, it can be said that a portal offers centralized access to all relevant content and applications.

1.6.9.4 Portals to support KM

Information may be organized is such a way that encourages knowledge shering not only within groups but also between groups. This takes IM and turn into KM, and portals can do this. Soutar and Lloyd-Walker state that the greatest contribution that KM makes is not just in providing objective information, it is in a way enables the transfer and use of tacit knowledge and its conversion to explicit knowledge. Portals can support expertise, creativity, innovation and skills of some of the forms of knowledge that are captured, codified, and shared in a knowledge creating organization.

Portals enable organizational knowledge from different sources to be pooled, organized and distributed through a single access point. The gateway that the portal provides. Portals enable information from various databases to be integrated, categorised, shared and used to advantage.

Portals play important role in managing knowledge and facilitating knowledge sharing in :

- Streamlining information.
- Exploiting customer, specific data
- Fostering team collaboration data
- Gathering expertise systematically at one place
- Combining information from multiple sources within the organization, according to the needs of the users.

1.6.9.5 Role of Portals

1.6.9.5.1 Increasing Efficiency

KM practices, supported by well designed portals, can assist employees to make more efficient use of their time. Efficiency therefore is the major reason for developing a portal. In today's knowledge workplace, portals can perform some of the tasks of a knowledge worker, i.e. gathering information, searching it for desired content, organizing, analying it and sheering it.

1.6.9.5.2. Benefits of Storing Information

Some of the benefits of storing and sharing information from a central database includes reduced photocopying, filing and use of paper.

1.6.9.5.3 Need based Information

Most KM initiatives are supported by claims of need based easier access to an even increasing amount of information stored, reducing access time, increasing relevance of information delivered and facilitating knowledge transfer and sharing.

1.6.9.5.4 Reducing time in locating Information

The goals of productivity inprovement, reducing costs, increasing profits can lead to reducing time taken to locate information in an organization.

1.6.10.Summary

Describes the concepts of KM and IM while defining what constitutes

knowledge. Considers knowledge as intellectual property and discusses its types. Explains the functions of KM for improving the strategy of organization. Attempts to differentiate between IM and KM in the context of their respective objects looks at the role of libraries, information centres, databases, networks, gateways and portals etc. in improving KM. Concludes that the new developments will ultimately have deep impact on information professionals who will be directly or indirectly involved within the organization.

1.6.11. Self-Check Exercise

1.   Define Knowledge. Give its types.
2.   What is knowledge Management? Explain its functions.
3.   Explain the concept of Information Management.
4.   Differentiate between IM and KM.
5.   Discuss the role of libraries and information centres in KM.

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1.6.13. Answer to Self - Check Excrcise

1.   See section 6.2 and 6.3
2.   See section 6.5
3.   See section 6.4
4.   See section 6.6
5.   See section 6.7