# UNIT 4 KNOWLEDGE: DEFINITION, TYPES, NATURE, PROPERTIES AND SCOPE

**Structure**



## 4.0 OBJECTIVES

After reading this Unit, you will be able to:

- get a fairly good idea of knowledge and its meaning in the context of our study;
- perceive the composition of knowledge into subjects;
- recognise the characteristics of knowledge;
- distinguish personal knowledge and public knowledge;

- understand Polanyi's tacit and explicit knowledge and the three worlds of knowledge as propounded by Popper;
- get an insight into the formation of knowledge, origin and growth pattern of disciplines; and
- get an exposure to sociology of knowledge, science and literature.

## 4.1 INTRODUCTION

In this Unit, we shall study knowledge in all its ramifications in the context of library and information science. Knowledge has always been a prime source through which human societies have advanced materially and elevated themselves spiritually. Knowledge comprises many hundreds of fields and sub-fields, known as subjects, which are interlocking and interlinking. This universe of knowledge is infinite, dynamic, and continuously expanding. The structure of a subject is never complete or closed; every aspect of it remains always open, offering new problems for further study and research. Knowledge is also seen as personal and public knowledge, as tacit/implicit and explicit knowledge. Popper sees knowledge as three worlds viz., physical, subjective and objective knowledge.

Knowledge structure growth and development has a pattern. This aspect of knowledge formation, its structural growth, and related aspects are studied by scholars. Dr. Ranganathan has examined the formation of knowledge in the context of classification design and development. Knowledge is also deemed to comprise different disciplines. Citation analysis and subject scattering form useful studies. Knowledge and its parts can also be mapped as in an atlas to have a graphic view of its ramifications.

Knowledge being a social product, its sociology is of interest to us as well as its sub-sets sociology of science, literature, and reading. Finally knowledge utilisation is the ultimate goal, which gets the human being, the value and utility.

The advent of Information and Communication Technology (ICT) has offered a tremendous opportunity to generate new knowledge, disseminate, distribute, and provide access and many other facilities cutting across space. All these aspects of knowledge are studied in this Unit.

## 4.2 KNOWLEDGE

From cave life to the sophisticated life of the information/knowledge society, knowledge has been the prime resource that has advanced human communities materially and spiritually. While we are not concerned with spiritual advancement in this Unit, knowledge in all its dimensions forms an important subject of study for library and information professionals. It will enable them to plan, organise and offer useful services to those who seek knowledge.

In this Unit, we attempt to study knowledge with reference to its definition, nature and characteristics/properties, its type(s), structure, formation and scope. We shall also study the way knowledge has grown and developed into subjects/ disciplines, its sociology and other related aspects.

## 4.3 KNOWLEDGE: DEFINITION

A precise single definition of knowledge, universally acceptable to all and in all contexts, is well nigh impossible. Scholars who are interested in the study of knowledge, as a resource, as a philosophical concept, as social wealth, etc. have given their own definitions to suit their line of studies.

The meanings of "Knowledge" as given by the Random House Dictionary (RHD), and words synonymous with 'knowledge' are:

- Acquaintance with facts or principles, as from study or investigation; general erudition;
- Familiarity or Conversance, as with a particular subject or branch of learning;
- Acquaintance or familiarity gained by sight, experience, or report; as for example 'knowledge of human nature';
- The fact or state of knowing, clear and certain perception of fact or truth;
- Awareness, as of a fact or circumstance;
- That which is or may be known; information; and
- The body of truths or facts accumulated by mankind in the course of time, as for example 'man's knowledge of the moon'.

Words synonymous with 'knowledge' given in the RHD are Enlightenment, Information, Understanding, Discernment, Comprehension, Judgement, Wisdom, Lore, and Science.

Another approach to define knowledge is that the word 'knowledge' has its roots in the Greek word *gnosis*. A word that uses the same root is 'recognise'. We know what we recognise. This means that we mentally process our experience, shaping it and giving it mental forms that we can identify. So we recognise experience and bring it into the realm of knowledge. This approach to the meaning of knowledge cuts across the meaning of knowledge given by RHD.

Daniel Bell, the Harvard University Professor of Sociology while discussing 'knowledge' as the moving force of the Post-industrial Society, gives a comprehensive definition of knowledge as follows:

"Knowledge is an organised set of statement of fact or ideas, presenting a reasoned judgment or an experimental result, which is transmitted to others through some communication medium is some systematic form. Knowledge consists of new judgments (Research and Scholarship) or presentation of older judgments as exemplified in text books, teaching and learning and collected as library and archival material."

Alvin Toffler, the well known author of *Future Shock, Third Wave and Power Shift,* gives another meaning of knowledge, which includes data, information, images and imagery, as well as attitudes, values and other symbolic products of society whether true, approximate or even false.

In the fast emerging new discipline of 'Knowledge Management', Davenport defines knowledge as follows:

"Knowledge is a fluid mix of framed experience, values, contextual information, and expert insight that provides an environment and framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers. In organisations, it often becomes embedded not only in documents or repositories but also in organisational routines, processes, practices, and norms."

Considering all these approaches to the definitions of knowledge, we can arrive at a working definition of knowledge for our discussion in this Unit.

Knowledge is a highly organised intellectual product of humans that includes personal experience, skills, understanding of the different contexts in which we operate our activities, assimilation of all these and recording all this in a form that could be communicated to others. This communication of recorded experience, data, information, etc. makes for further of growth.

**(Note:** This Unit should be studied along with the Unit 3, of this course on Information, Nature, Definition, Types, Properties and scope to get its full importance**)**

**Self Check Exercise**

1) Give the definition of knowledge as understood in the context of knowledge management.

**Note:** i) Write your answer in the space given below.

ii) Check your answer with the answers given at the end of the Unit.

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## 4.4 KNOWLEDGE: NATURE, CHARCTERISTICS/PROPERTIES

We have also learnt in Unit 1 of this Course, that knowledge has been defined to constitute a stock of organised and structured ideas and concepts, validated by peer groups. When we talk of knowledge, we recognise that it comprises number of subjects, each having its own parameters and scope for independent study. However from the beginning of this century, the universe of knowledge comprises increasingly numerous subjects, which are increasingly multidisciplinary, interlocking and interlinking many disciplines, moving in multidimensional ways.

It is also said that our knowledge base today, includes much more than the traditional Natural Sciences, Social Sciences and Humanities. It covers a nation's strategic conceptions, its foreign intelligence, its capabilities, and its cultural and ideological impact on the world. Thus, the control of knowledge

is the crux of a worldwide struggle for power as the most powerful weapon.

Knowledge utilisation is fundamental to its use. Knowledge, merely stocking it in whatever form, may be of little consequence, if it is not used properly. Again knowledge can be used for the good or ill of living beings. Destructive weapons (atomic weapons) are got out of intense research ostensibly for a nation's security. But, if is used indiscriminately, it would bring about total annihilation of all living beings.

We shall present below some of the important characteristics of knowledge:

- Knowledge is infinite.
- Knowledge is dynamic, continuous, and ever expanding.
- No final word can ever be said of any discipline; they are at best provisional, subject to criticism, correction, contradiction, change or modification.
- A gifted man may acquire wide knowledge, deep wisdom and spiritual insights but all these are lost when he/she dies except those that he/she had recorded.
- Knowledge once parted to others, results in no loss to the person.
- Knowledge becomes obsolete.

**Self Check Exercise**

2) List the characteristics of knowledge.

**Note:** i) Write your answer in the space given below.

ii) Check your answer with the answers given at the end of the Unit.

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## 4.5 KNOWLEDGE: TYPES AND SCOPE

We have so far studied the nature of knowledge, what it comprises, and its characteristics. In this section, we shall discuss different views of knowledge.

### 4.5.1 Personal and Public Knowledge

Knowledge is broadly divided into two groups, personal knowledge (private knowledge) and social knowledge (public knowledge). Personal knowledge is the knowledge of the individual and as such is available to others only if communicated. Social knowledge is the knowledge possessed collectively by a society. It is supposed to be available to all the members of the society freely and equally. Libraries and information centres provide this kind of knowledge. It must be, however, stated here that these two kinds of knowledge are not mutually exclusive. Social knowledge is an essential source of personal

knowledge and it is from personal knowledge that most social knowledge is built up.

Ziman, the distinguished physicist, emphasises the importance of the organisation of public knowledge. There are three aspects to the organisation of public knowledge viz. a) organisation by creating, b) self-organisation and c) bibliographic organisation. Organisation by creation is the result of the efforts of those that generate knowledge by means of experiments and other methods of investigation and record them in a form to be communicated. Self-organisation refers to the references cited to any document to other documents, establishing a thought link between the citing and cited documents. When extended, it provides a very interesting intellectual organisation of knowledge that can cut across the conventional classificatory norms known to librarians. We shall study this aspect later in this Unit.

Bibliographic organisation refers to the organisation of primary documents in bibliographies, indexing and abstracting journals and other various types of information products and services. All these are handled by libraries and information centers.

### 4.5.2 Tacit and Explicit Knowledge

The above two groups of knowledge is expressed slightly differently by Michael Polayani. Explicit knowledge is that expressed to others, orally or in a recorded form and tacit knowledge is personal knowledge that may or may not be expressed by an individual. Generally most people express their personal knowledge up to a point but not beyond for reasons of their own. Sometimes it may be deliberate or sometimes they may not be able to describe their special skill. For instance a particular skill in arts and crafts may only be demonstrated by an expert and not explained. In music, a curve of a musical phrase may be demonstrated by an expert but may not be conducive to be described or explained. This makes Polayani to point out that we know more than we can tell or explain to others. “Another way of distinguishing between tacit and explicit knowledge is knowledge of the body, which is subjective, practical, analog while explicit knowledge is of the mind which is objective, theoretical and digital.” Quite often we talk about the body language, facial expressions and other signals that communicate quite a lot of the intention of the person but never expressed in words. Therefore it is said that tacit knowledge is highly personal and hard to formalise, making it difficult to communicate or share with others.

However tacit knowledge is as important as explicit knowledge. In the new discipline of Knowledge Management, it is this tacit knowledge, which is valued very highly, constituting the real strength of a company. It is this knowledge of individuals that need to be extracted by various means and methods, to build up the organisational strength of a company to be competitive in a market.

### 4.5.3 Three Worlds of Knowledge

Another view of knowledge is the way Karl Popper has identified knowledge groups, more on a philosophical plane. Popper ontological scheme is to see three worlds of knowledge. viz., World 1, the physical world in which earth, vital though it is to us, but an insignificant speck in the immensity of the

universe of radiation and matter. World 2 is the world of subjective human knowledge, corresponding to individual knowledge. The World 3 is objective knowledge, which the product of human mind recorded in languages, in arts, the sciences, the technologies – in all the artifacts humans have stored or scattered the earth.

Although these three worlds are independent, they also interact. As humans living on earth, we are a part and parcel of the physical world, dependent for our continued existence on heat and light from the sun, oxygen from the air, carbon-dioxide being absorbed by plants, fresh water from springs, carbohydrates and proteins from our foods and so on. Through our mind and intellect and other sense faculties, humans observe everything in their environment and make our own subjective understandings. World 3 is one which all human thoughts, ideas and experiences are recorded in the form of print and non-print media which are the stock in trade for all libraries and information centers.

Personal knowledge is short lived. Human history has seen great persons, achieving extraordinary successes in ever so many walks of life. Such outstanding persons with great caliber have left their prints in history. But their personal knowledge is gone no sooner they die. Such persons are not born in every generation. Although knowledge includes personal and public knowledge, personal knowledge has a short life; invariably all tacit knowledge are not possible to be recorded.

**Self Check Exercise**

3) Distinguish between personal and public knowledge.

4) Why is personal knowledge short lived?

**Note:** i) Write your answers in the space given below.

ii) Check your answers with the answers given at the end of the Unit.

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## 4.6 FORMATION OF KNOWLEDGE

The organisation of public knowledge in their physical forms of print and non-print materials, in libraries and information centers, has to continuously grapple with the rapidly expanding dimensions of knowledge. Not only new disciplines are emerging, the multidimensional and interdisciplinary nature, and a host of other factors makes it essential to keep the tools of organising collections with the same pace of the growth of knowledge. Libraries and information centers disseminate information about their collection through their catalogues,

bibliographies, indexes, abstracts and other such products. Provision of subject approach to documents through these types of secondary tools, has been and is a major challenge to library and information professionals. Classification Systems, Subject Heading Lists, Information Retrieval Thesauri are some of the tools and techniques that have been employed in information storage and retrieval. These tools have to keep updated with the expanding horizons of knowledge. The designing of these tools and their developments need to be on a theoretical basis to respond to the unprecedented expansion of knowledge.

This need was seen by Ranganathan and he developed his general theory of classification with laws, normative principles, postulates, canons, etc. not only to take care of past and present knowledge but also for the future developments. He provided a general framework for organising isolates in any subject through his concepts of Basic Facet, Fundamental Categories of PMEST, which has become a model for other systems to adopt or adapt. In designing schemes for classification of subjects, he felt the need to study the ways subjects grow and get formulated. This resulted in his general enunciation of modes of formation of subjects. The following are the five preliminary modes of formation of subjects and isolates initially identified and expounded by Ranganathan.

### 4.6.1 Ranganathan's Modes of Formation of Knowledge

**Dissection** "is cutting a universe of entities into parts of coordinate status, even as we cut a slice of bread into strips." When the parts are ranked, they form an array. Each part is termed as a "Lamina".

**Example:** Botany, Agriculture, Zoology constitute the dissected members of the Universe of Basic Subjects.

**Lamination** "is a construction by overlaying facet on facet, even as we make a sandwich by laying a vegetable layer over a layer of bread. When the basic layer is a Basic Subject and the other layers are isolates, a compound subject is formed."

**Example:** In the subject "Agriculture of Corns", the two layers, Agriculture and Corn lie on both the ends of the Basic Subject Agriculture and isolate idea Corns. There can be more layers of this type.

**Denudation** " is the progressive decrease of the extension and increase of the intension (or the depth) of a Basic Subject or an isolate idea, even as we scoop the flesh of a soft fruit from deeper and deeper layers or as we excavate a well". In the words of Shera denudation is "the exposure of a new area of knowledge by erosion or divestment through research or enquiry."

**Example:** Philosophy, Logic, and Symbolic logic.

**Loose Assemblage** "is the assembling together of two or more subjects."

**Example:** General relation between Political Science and Economics.

**Superimposition** "is connecting together two or more isolate ideas belonging to the same universe of isolate ideas. The need for this usually arises when an entity is eligible to as isolate idea on the basis of two or more quasi isolate ideas."

**Example:** Sociology of Rural Poor.

## 4.6.2 Neelameghan's Extension

Based on Ranganathan methodology, Neelemeghan worked further on these ideas of the modes of formation of subjects and enumerated a few micro modes. These are:

**Fission** is the process of division or splitting or breaking up into parts. The process has, until recently, been denoted by the term "Dissection". However, "Dissection" usually implies the splitting, breaking up, etc. of an entity into parts by an outside agency. On the other hand, Fission is an internal process of division without the involvement of an outside agency.

**Distillation of Kind 1** A distilled subject is one which gets formed on the basis of some or similar or common observation, experiments and experiences in several subjects.

**Example:** Management Science, which is distilled out of studies in the management of science laboratories, universities or industries and such others. Other examples of such subjects are Systemology, Metrology, Research Methodology, and Conference Techniques.

**Distillation of Kind 2** From time to time, for various academic and sociological reasons, scholars may study extensively and in depth some particular idea or even several ideas. This may lead to a considerable literary warrant for the ideas generated. The publication of a new periodical, the organisation of a faculty in a teaching institution, the formation of a research group, the formation to have an independent status as a subject in its own right.

**Example:** Statistical Calculus developing from Mathematics, Microbiology developing from Biology and Botany. International Relations developing from Political Science; Demography developing from Sociology.

**Fusion** is a result of interdisciplinary research with characteristic trends in present day research programs. These efforts lead to the emergence of a new set of ideas or theories of an interdisciplinary character. These ideas attract a group of specialists and a new field of specialisation emerges with its own normative principles, postulates and theories.

**Example:** Astrophysics, Biomechanics, Psycholinguistics, Socio-cybernetics

**Clusters** are formed of subject fields wherein there is a core entity of study with inputs or viewpoints or works on it coming from specialists from diverse subjects.

**Example:** Studies in Sinology, Tibetology, Studies centered around famous personalities – Gandhiana; Studies grouped together as in Defense Sciences.

**Others:** Environmental Sciences, Ocean Sciences, etc.

**Agglomeration of Kind 1** consists of subjects treated integrally or distinctively in one and the same document.

**Example:** Natural Sciences, and Humanities.

**Agglomeration of Kind 2** constitutes subjects comprehending other subjects with respect to the schedules of a particular scheme of classification.

**Example:** Psychology and Sociology as in UDC.

**(Note:** These are illustrations, not exhaustive listings of the different kinds of modes of formation.)

These studies of Ranganathan and Neelameghan have been developed in the context of designing classification schemes such as Colon Classification. They may be useful in contexts other than this also. For instance the intellectual organisation of information knowledge and information for various other purposes, collection development, information storage and retrieval and others. Research studies on the formation of formation of subjects are a continuous effort as new subjects/disciplines keep on emerging. As we know no final word can ever be said on any research effort. They are at best provisional.

**Self Check Exercise**

5) Enumerate the modes of formation of subjects as propounded by Ranganathan and extended by Neelameghan.

**Note** i) Write your answer in the space given below.

ii) Check your answer with the answers given at the end of the Unit.

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## 4.7 ORIGIN AND GROWTH PATTERN OF DISCIPLINES

Formation and structure of subjects of Ranganathan and Neelameghan are one method of studying the growth of subjects. There are also other observations made by scholars as to how disciplines get formed and what are their attributes. In this section, we give a brief resume of this approach to knowledge.

### 4.7.1 Disciplines

Giving an overview of the social organisation of knowledge and information, McGarry observes that a discipline is a branch of instructions, of mental and moral training. Etymologically it is derived from the word ‘disciple’ which means one who learns. A scholarly discipline is an organised field of enquiry pursued by a community of knowledgeable persons. In contrast to vocational and skilled crafts, persons involved in their scholarly disciplines are acutely conscious of the historical and social envirionment of their intellectual commitment. They act as authorities in their particular fields. The results of their activities in the form of theories and formulations are included in the curricula in all formal schools of learning.

### 4.7.1 Attributes of Scholarly Disciplines

Some of the attributes of scholarly disciplines are:

- It enables distinguishing between knowledge and opinion. Opinions do not have anything to do with scholarship; they are subjective and conditioned by one's own perception of things. Knowledge is the outcome of disciplined enquiry and is developed by criteria of justification and validity.
- Disciplines of knowledge are composed of people. Communities of scholars share a domain of certain intellectual enquiry or discourse. Their deliberations result in a body of knowledge which eventually gets formed into a discipline.
- A discipline may contain knowledge and information of all degrees from the simple introductory textbooks to the complex elaboration of specialists symposium. Authenticity which is the outcome of learning, scholarship applying critical scrutiny and rigorous methods of evaluation, judgment, etc., lend quality to the discipline.
- A discipline is not a collection of a summary of ideas and a rule of thumb technique ; it has form, pattern and structure.
- Each discipline has a distinct domain of enquiry and specialised methods by knowledge is created and validated.
- Every discipline classifies its domain in a particular way, according to its ramification. This gets reflected in all writings in the discipline.
- Each discipline has a documentary communication structure through which ideas are conserved, transmitted, assessed and validated.
- A discipline has its own specialised vocabulary which serves the scholarly community both as a medium of communication and as a thesaurus for mapping out the domain of study.

Disciplines differ in their purpose, methods and domains of enquiry and they differ from each other in varying degrees. Meanings in Biology are often the same logical type as meanings in the Physical Science in that they are empirical descriptions of matters of fact ideally formulated in terms of exact laws and explanatory theories of great generality. In the Humanities and the Fine Arts, the *Form* becomes the subject matter and the other concepts are the singularity of the work. Accordingly, there are strong and influential bonds between the social and intellectual organisation of subjects disciplines and its modes of communication and information transfer.

### 4.7.3 Relevance to Library and Information Studies

An important part of work of the library and information professionals lies at the intersection of disciplines in organising literature search services and other related information storage and retrieval efforts. Studies on *Knowledge about knowledge* give the professional an insight into the disciplines to intuitively work out the strategy for content analysis and synthesis.

In the final analysis, one can study the academic contents of disciplines to see how they are related to use and for the provision of library and information services.

**Self Check Exercise**

6) State the purpose of the study of 'Knowledge about knowledge' in the light of interdisciplinary nature of modern subjects.

**Note:** i) Write your answer in the space given below.

ii) Check your answer with the answers given at the end of the Unit.

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## 4.8 MAPPING OF THE STRUCTURE OF SUBJECTS

The previous two sections dealt with the modes of formation of subjects and the origin and patterns of growth of disciplines respectively and their relevance to library and information studies.

In this section we shall study another model of structuring subjects and mapping them to get a view of concept relationships in subjects.

### 4.8.1 Citation Analysis and Subject Structuring

An interesting method of structuring of concepts has been conceived by Eugene Garfield, the innovator of Citation Index and Citation Studies. Citing a reference in books, research papers, journal articles, conference papers and similar other documents, is an age long practice. The citing and the cited articles have a relationship between them by virtue of the authors having some connections to the ideas propounded in both the cited and citing articles. The relationship established between the two articles, transcends the formal reference value and establishes the conceptual relationship between them. At a deeper level, it can be discerned that there is a relationship between the two articles. This method of citations when analysed with reference to many other citations brings to the surface, a cluster of concepts, which have some intrinsic relationship between them, which is much beyond the conventional hierarchical and associative relationships between concepts. This has been very effectively captured by Garfield in his mapping of the structure of some subjects.

This method of identification of clusters of concepts related to a subject bears evidence to the interdisciplinary nature of newly emerging subjects. The problem of seepage and scattering of articles in core, peripheral and alien periodicals has been a serious constraint in meeting the information needs of researchers and other types of users in library and information centres. This approach in clusters using citations is a useful method. This is particularly

helpful in computer searching wherein the relationships between concepts are captured in a matrix.

### 4.8.2 Graphic Display

Most of the classification schemes display the concept relationship in subjects in linear fashion, indicating them by various types of indention and other methods of display techniques. In this method, there is a restriction imposed by the linear display of concepts whereas these concepts are truly multidimensional in their relationships. This problem of display is generally overcome by graphic display methods, which may map the hierarchical and associative relationship.

This method of graphic presentation of concepts of multidimensional relationships brings out the ramification of subject concepts effectively. This makes it easier for an indexer or a searcher in storing and retrieving work. An atlas of the different broad concepts may be required to show the relationships between major groups and narrow concepts in specific subjects, as in geographical atlas of world, continental, country, and smaller geographic divisions.

## 4.9 SOCIOLOGY OF KNOWLEDGE

We have so far studied knowledge, its varied definitions, distinguishing personal knowledge from public knowledge, Polayani's tacit and explicit knowledge, Popper's three worlds of knowledge, Ziman's perception of public knowledge, formation of knowledge and its extension by Ranganathan and Neelameghan respectively, ramifications of disciplines, citation and subject structuring, and mapping of subjects.

All these give us an idea of how knowledge has been studied from different angles. In this section, we shall learn about another dimension of knowledge study viz. Sociology of Knowledge.

Knowledge, it is said, is a product of humans and gets aggregated over a period of time and also keeps on expanding. It is also said that it is a social product. Hence it has been studied by sociologists, as a artifacts of human beings. Sociology is defined as the science or study of the origin, development, and organisation and functioning of human society. One of the major contributions of human society is knowledge, which has been the basic strength for the human society to grow, develop and advance. As a theory, Sociology of knowledge, seeks to analyse the relationship between knowledge and existence, as historical social research, it seeks to trace the forms that this relationship has taken in the intellectual development of mankind.

*The International Encyclopaedia of Social Science* (1968) defines Sociology of knowledge as follows:

"The sociology of knowledge may be broadly defined as that branch of sociology which studies the relation between thought and society. It is concerned with the social or existential conditions of knowledge."

Two world hypothesis, which has been heuristically very useful in positioning relation between groups and cultures represent fundamentally different

orientations. These two worlds are science and the humanities.

To sum up, sociology of knowledge charts out the scope of the subject by developing a relationship between knowledge and existence, thought and society, groups and culture, and science and humanities.

In the next sections we shall discuss sociology of science, literature, and reading in all of which, library and information professionals are vitally interested.

**Self Check Exercise**

7) What are the roles of sociology of knowledge?

**Note:** i) Write your answer in the space given below.
ii) Check your answer with the answers given at the end of the Unit**.**

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## 4.9.1 Sociology of Science

Sociology of science is the nature of scientific ideas, and their development, structural organisation, individuals and the groups involved in scientific activities. In other words, Sociology of science is primarily concerned with a construction of a set of highly generated systematic and relatively exhaustive concepts and propositions of relationships. It is interested not only in fundamental scientific ideas themselves, but also in their applications to technology. In this process, it uses both historical and contemporary data, drawn from a variety of cultures, to serve its primary goal of constructing a system of analytical concepts and propositions.

**The Social Structure and Development of Science**

Sociology of science sees man's scientific behaviour as his/her response to the functional problem created by the need to have an adequate knowledge of the physical, biological and social aspects of the empirical world. In order to explain the degree of development of science, four general components of science as a whole are given, each of which has a measure of autonomy. These are: a) Substantive scientific ideas; b) Scientific methodology, including both ideas and instruments; c) Scientific roles; and d) Motivational and award for scientific roles.

Substantive scientific ideas very true dimensions of: i) generality or abstractness; ii) exhaustive for the relevant aspects of the phenomena. It is said that the more abstract, systematic and exhaustive, a set of substantive scientific ideas is the greater of its scientific development.

Among the interesting problems that sociology of science tries to explain is the question of why the physical sciences have developed more rapidly in all

these three respects than have the biological sciences and why these in turn, have developed more rapidly than the social sciences. Among the social sciences, there have been more recent developments in economics than in political science or sociology. This can be explained at least in part by the greater accessibility of data on a variety of economic phenomena than of data on people's political and social norms and actual behaviour.

Knowledge about ideas and instruments that make up scientific methodology varies in its degree of development. Modern science has made great advance over earlier Science in its development, largely due to the knowledge of essential methodologies such as the character of concepts and clarification, the logic of comparison and inference, and the function of contrived and natural experimentation. An important sociological fact about the development of social science is their ability to borrow a great deal of the methodological sophistication from other disciplines of science.

Another factor for the development of science is the motivational and the award/ reward system for the roles of scientists.

**Self Check Exercise**

8) State the general components of science in explaining its degree of development.

**Note:** i) Write your answer in the space given below.

ii) Check your answer with the answers given at the end of the Unit.

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**Sociological Characteristics of Science**

i) **Structural Differentiation**

The degree of structural differentiation in a society and specialisation of roles between major scientific institutions, provide a set of more favourable conditions for the development of science. Certain values are much more favourable to the development of science than others. One such value is "Libertarianism" i.e., academic freedom. This is one kind of important foundation for scientific progress.

ii) **Environment**

Scientific knowledge is power i.e., power to adjust more or less satisfactorily to the non-social environment and in the internal and external social environment. Social and environmental pressures quite often trigger major scientific discoveries and technological innovations. This is true of all stages of history. These can be illustrated by examples from national defence for security, industrial and agricultural growth to withstand competition, health care, etc.

## Factors Influencing Scientific Development

A variety of economic needs and resources often combined with one or more other social factors, have had very large direct and indirect influences on the development of science. In the modern world, both organisation and governments have provided many kinds of support for science in order to pursue economic interests and needs. Direct support exists in the form of governmental and industrial reseach laboratories; indirect support is given through tax concessions and incentives, financial and other forms of subsidies to both universities and industry.

The desirability of using science to meet economic needs and increase economic resources is no longer in question anywhere among the societies of the modern world. Political factors, closely combined with economics, influence scientific research and developments. Research on the nature of metals, on the causes of chemical reactions and explosives, and on the mathematics of the curves of ballistic missiles, has been spurred by military needs to maintain a balance of power.

The maintenance of science is very much facilitated by an educational system that is sufficiently specialised, geared to growth and development.

## Motivation and Award/Reward System for Scientists

Institutionalisation has been a special feature of modern civilisation. Universities, various government organisations and many industrial firms, having recognised the value and consequent need for Science, have established regular and permanent roles and careers for scientists. In addition, a variety of special research institutes with endowments from foundations, commercial associations and other special interest groups, are sometimes operated by private individuals, and they further provide specialised jobs for scientists.

The mere existence of social roles for scientists is not enough for their full contributions. Adequate and legitimate awards for those who perform very distinctive roles should be made available to motivate them to give out their best. Titles, prizes, medals, higher offices and other eponymous (in the name of a person of outstanding) distinctions, symbolise the existing hierarchy of differential prestige. Both at the international and national such award/reward systems exist to give incentive to highest performance in science.

The Nobel Prize in any of the four scientific disciplines viz. Physics, Chemistry, Medicine and Physiology, Economics in which it is granted is the best-known hall mark of scientific achievements.

Therefore, the role of the scientist is subject to structured set of motivations and rewards. Interestingly, it is said that the scientist is no more a “selfless” creature above and beyond the influence of his social role.

## Communications among Scientists

One of the essential ingredients of the development of society is a peer review group, which validates scientific findings. This is achieved in many ways. All these involve an effective communication system in the diffusion and dissemination of scientific research. One of the important objective inventions towards this, is the creation of learned societies whose essential objective is to provide a forum for scientists to meet at regular intervals and to promote

scientific activities. The Science Journal is an outcome of such efforts. Through participation in national and international conferences, informal visits to institutions, letters, circulation of reprints, mimeographed materials scientists strive to maintain effective communication without which their activities would slow down considerably. The computer and communication technologies, the Internet, e-mails and such other facilities have accelerated the speed of communication.

**Self Check Exercise**

9) Enumerate a few of the factors influencing scientific development.

**Note:** i) Write your answer in the space given below.

ii) Check your answer with the answers given at the end of the Unit.

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**Science Posing Problems**

There are two aspects of science that are perceived as social problems. One pertinent to scientists' sense of interference in their field of activities by extraneous factors. For example, scientists resent what they define as unnecessary controls on their work. They complain about insufficient financial support for their preferred types of research. They wish to throw nationalistic and other parochial limitations on their research communication activities. A variety of organised and unorganised means of protest now exists among scientists to cope up with these problems.

The second aspect of the problem is with reference to the evil effects that science may bring to society. Some harmful consequences of science are given as examples for restricting the influence of science or even eliminating it. It is, therefore, defended that responsibility for harmful social consequences of science rests not directly with scientists but with the several established social and political processes for handling social problems. It has also come to be recognised that scientists can play a variety of social roles in these social and political processes to ensure that it is not a science problem that harms the interest of the society. A number of social and political arrangements are now being worked out, to permit scientists to act as expert advisers on the technical aspects of the social problems to mitigate the unsocial and harmful results of science.

## 4.9.2 Sociology of Literature

Another subset of sociology of knowledge is sociology of literature, which gives expression to human imaginative and artistic outputs, in relation to the social environment in which such works are created.

Unlike contributions in the physical, natural and social sciences, a literary work is imaginative, and in its entirety a product of the human mind. A literary work may take different forms of presentation (poetry, drama, novel, short stories, etc.) and may reflect social life and environment in all dimensions. It may have artistic and aesthetic quality, couched in an attractive but simple language with clarity of thought and ideas. A literary work establishes a relation between the writer and the readers to whom the work has an appeal. It is a meeting or sometimes the clashing of two free acts, one of production and the other of consumption with all their effects and side effects on moral and social relations. "There is always another man in literature, a writer for a reader and reader." So sociology of literature relates to the study of the writer as a professional person, the literary work that the person produces, the reader of the work as a consumer and the publisher and bookseller who promote its use.

**Literary Milieu**

A work of literature is a product of a literary milieu in which thoughts and ideas are exchanged, judgment on them passed, and values stated in them are discussed. The existence of such a milieu is and always has been inseparable from the very fact of literature. Literary work, is, in fact, conceived as a two-way communication; messages are broadcast by the writer to a community of readers whose response may bring writers reputation and status in the community of writers or may do the opposite by bringing him/her disrepute.

Literary milieu, being part of a broader societal milieu, the whole network of literary intercourse is subject to all conditions imposed by social life. In fact, the amplitude, the significance, the richness, in short the quality of literature depends to a large extent on the place a particular literary work occupies in the literary milieu and consequently by the writer's place in the society concerned, on the awareness of the situation in which the work is produced and other related factors.

**Literary Recognition**

A writer invariably seeks recognition for the literary work he/she produces. In general all writers do not get the recognition they seek. It has been studied that the number of writers who get recognition and establish, represent only one percent of the total number who actually write and publish literary works. Of the several factors that contribute to the selection process of recognition, the following are some:

- A certain amount of contemporary literary recognition that a writer already has;
- The place of the literary work in the educational curriculum at all levels i.e. from the elementary to the advanced levels, reference in other works, and in encyclopaedias such others; and
- The existence of a class and political structure to which the writer belongs.

In sum, the small group responsible for the literary recognition of writers and for the literary opinion that builds up for a writer, usually rests with university intellectuals, those belonging to the influential circles, moneyed class and the upper crust of high political or technical strata of society.

**Literature and Mass Communication**

The printing and publishing of books on a mass scale is an important landmark in literature dissemination and distribution. Then introduction of paperbacks, which is comparatively a recent development, afforded a technical means for a fresh image of the book as a means of mass cultural communication. Paperbacks as is well known, have become very popular. A sale of a million copies of booksellers is a normal feature today particularly in the western countries.

Apart from their role of dissemination and distribution, publishers play a very decisive and significant role in selecting literary works of quality and also take the risk in investing on their publication. In this process, the publisher is conditioned by the substantial capital investments. He/She is naturally anxious to avoid commercial loss, and he does this by limiting the experimental titles of works to elites or by abandoning the idea of 'creative' publishing and strictly program his/her production to the functional needs of a pre-selected mass market.

**Self Check Exercise**

10) What constitutes of sociology of literature?

**Note:** i) Write your answer in the space given below.

ii) Check your answer with the answers given at the end of the Unit.

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## 4.9.3 Sociology of Reading

No sociology of literature is meaningful without a sociology of reading and the cultural impact that reading habits have on the society. While it is rather difficult to define a reading public precisely, a few attributes of such a group can be identified. These for a literary work are the actual mass of readers, their core composition in terms of their educational, economic, cultural and other related status. However, the case of books reaching unexpected and even unsuspected public beyond social, national, linguistic, temporal barriers, are becoming numerous.

This is an area of considerable interest and importance to the library and information community. Very little work has been done in India to study the reading public in general or with reference to any particular tiles in English or in any Indian language. Planned research, is however, essential to get right results. Some of the organisations like the Sahitya Akadami, the National Book Trust, the National Library of India, The Raja Ram Mohun Roy Library Foundation and some leading publishers may also be interested in such studies to fund research projects. It is for the professional associations to pursue such efforts.

Sociology of literature in the contemporary situation with particular reference to India may be two fold:

- Helping persons or agencies responsible for book production in the various languages and regions to take stock of the new problems created by mass literary targets set for the country; and
- Helping the hitherto ignored masses of readers to gain aesthetic and artistic consciousness and claim their parts of cultural heritage to mankind.

## 4.10 KNOWLEDGE UTILISATION

We have known that global, regional and national studies, experiments and experience in socio-economic development indicate, that as a society moves from a pre-industrial state (agricultural stage) to industrialisation and on to the post-industrial state, it tends to utilise science, technology and societal knowledge in an increasing measure, in all developmental activities. Hence, it progressively becomes an information/knowledge society. This society is characterised by the increasing use and utilisation of knowledge in all its process of growth and development. In the knowledge society, knowledge is the key-determining factor for innovation, policy formulation and material progress. As a consequence of this recognition, there have been increasing efforts in creating new knowledge through institutions exclusively dedicated to research.

**Impact of Information and Communication**

Any discussion of knowledge use and utilisation would be incomplete if we do not take account of the unprecedented impact of information and communication technology (ICT). Today recorded knowledge in whatever physical form it exists is available throughout the globe cutting across space. The Internet with its multifunctional facility, incorporating the world wide web and e-mail and all the other components of electronic information and knowledge, has made it possible for interactive studies and exchange of ideas among peers. This extraordinary facility empowers, information-rich countries to have access to global knowledge. Knowledge being power, the accessibility and availability has already created the digital divide among the information rich and information poor countries. Yet the use of the Internet, however, has very considerably increased among the Asian and African countries. This is another dimension that needs to be kept in mind while discussing knowledge, its generation, storing, dissemination and distribution, accessibility and availability. ICT is not only a facilitator and enabler, but also could be highly productive.

**The Indian Scene**

While many of the attributes of an information/knowledge society may not be present in India, a few features, which are characteristic of the knowledge society, have surely emerged. The value of scientific and technological knowledge in the Indian context was eloquently articulated by Pandit Jawaharlal Nehru in the Scientific Policy Resolution (SPR) of the Government of India as far back as in 1958.

This policy has planted the seedlings in India and a very fine infrastructure has been built in India for knowledge generation.

The setting up of a number of R&D institutions in Science, Technology, Social Sciences, Humanities, the establishments of educational and training institutions of higher learning, centres for advanced studies in many disciplines, acquisition and cultivation of technological and managerial skills and expertise through institutes of technology and management, creation of learned societies and professional associations, consultancy organisations to bridge research and industry, multimedia centers and many others are undoubtedly meant to create the necessary conducive environment for knowledge creation, use and utilisation. India is also to become soon a super power in software technology, which is the soul of information technology.

**Self Check Exercise**

11) What is the infrastructure created in India to generate new knowledge?

**Note:** i) Write your answer in the space given below

ii) Check your answer in the answers at the end of the Unit.

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## 4.11 SUMMARY

In the Unit, we began with the definitions of knowledge, indicating the shades of differences in their meaning. The nature of knowledge along with its characteristics is briefly explained. In discussing the types of knowledge, we distinguish between personal and public knowledge, tacit and explicit knowledge and Popper's three worlds of knowledge. Knowledge is ever expanding, sometimes turbulently. This characteristic takes us to the study of the modes of formation of knowledge. The ideas of knowledge formation as propounded by Ranaganthan and extended by Neelemeghan are described with examples. Another view of knowledge is looking at knowledge as a set of disciplines; its origin, growth and nature are all explained. Another dimension of its study is its sociology. Sociology of science, literature, and reading which form the subsets of sociology of knowledge are discussed. Knowledge use and utilisation are the final goals of generating knowledge for the human advancement in all directions. The way knowledge use and utilisation are greatly enhanced by the unprecedented advances in information and communication technologies are briefly mentioned. The infrastructure built in India for knowledge generation and use are briefly stated.

## 4.12 ANSWERS TO SELF CHECK EXERCISES

1) Knowledge is a fluid mix of framed experience, values, contextual information, and expert insight and grounded intuition that provides an environment and framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of

knowers. In organisations, it often becomes embedded not only in documents or repositories but also in organisational routines, processes, practices, and norms.

2) The characteristics of knowledge are:
   - Knowledge is infinite intangible and difficult to measure.
   - Knowledge is dynamic, continuous, and ever expanding.
   - No final word can ever said of any discipline; they are at best provisional, subject to criticism; correction, contradiction, change or modification.
   - A gifted man may acquire wide knowledge, deep wisdom and spiritual insights but all these are lost when he dies except those that he had recorded.
   - Knowledge once parted to others, there is no lossto the person who parts with it. It sometimes increases with use.
   - Knowledge becomes obsolete.

3) Personal knowledge is the knowledge of the mind of an individual, although and as such is available only to him/her or through to others if communicated. Public knowledge 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 centers provide this kind of knowledge.

4) Personal knowledge is short lived because the person who has the tacit knowledge when passes away, the personal knowledge of that individual is lost, unless that knowledge is recorded.

5) Dissection, Lamination, Denudation, Loose Assemblage, Superimposition; Fission, Distillation of Kind 1, Distillation of Kind 2, Fusion, Agglomeration of Kind 1 and Agglomeration of Kind 2.

6) Studies of knowledge about knowledge gets the library and information professional an insight into the disciplines, to work out intuitively the strategy for information storage and retrieval, intellectual organisation of knowledge, collection development and many other users related information services.

7) As a theory sociology of knowledge, seeks to analyse the relationship between knowledge and existence. As historical research, it seeks to trace the forms that this relationship has taken in the intellectual development of mankind.

   The dual roles of sociology of knowledge are:

   To aim at discovering workable criteria for determining the interrelations between thought and action; and to develop a theory, appropriate to the contemporary situation concerning the significance of non-theoretical conditioning factors in knowledge.

8) Academic freedom, environment pressure, direct and indirect support to scientific research, motivations of scientists for research and creation of new knowledge, communication of scientific research and evil effects of scientific research.

9) Industrial and government support in relation to economic and social need

based research; political factors such as military needs, balance of power, etc. and increasing specialization in the educational system are some of the important factors associated with scientific developments.

10) Sociology of literature relates to the study of the writer as a professional, the literary work that the person produces reflecting the social values prevailing at a particular point of time in the society, the reader of the work as a consumer, and the publisher and bookseller as distributors of knowledge who promotes its use.

11) The setting up of a number of R & D institutions in Science, Technology, Social Sciences, Humanities, the establishment of educational and training institutions of higher learning, centers for advanced studies in many disciplines, acquisition and cultivation of technological and managerial skills and expertise through institutes of technology and management, creation of learned societies and professional associations, consultancy organisations to bridge research and industry, multimedia centers and many others are undoubtedly meant to create the necessary conducive environment for knowledge creation, use and utilisation.

## 4.13 KEYWORDS

**Aesthetics** : The theory of the fine arts and the philosophy of the mind and emotions in relation to it; that branch of philosophy which deals with the beautiful, the doctrine of taste.

**Citation** : When a reference "A" is cited in the citing article 'B', then the article 'B' is referred as 'Citation" of reference **'A'.**

**Discipline** : A branch of knowledge, subject of instruction**.**

**Libertarianism** : Principles or doctrines of the freedom of will.

**Milieu, Social** : Refers to the man's social environment or surroundings.

**Ontology** : The branch of metaphysics that studies the nature of existence.

**Private Knowledge** : The knowledge of the mind of an individual and as such is available to him/ her or through him/her to others, if communicated**.**

**Social Knowledge** : The knowledge possessed collectively by a society or a social system and supposed to be available freely and equally to all the members of the society.

**Sociology of Knowledge** : The science or study of the origin, development, organisation and functioning of human society.

**Subject** : An organised form of knowledge.

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