ALAGAPPA UNIVERSITY

[Accredited with 'A+' Grade by NAAC (CGPA:3.64) in the Third Cycle
and Graded as Category–I University by MHRD-UGC]

(A State University Established by the Government of Tamil Nadu)

KARAIKUDI – 630 003

Directorate of Distance Education

Bachelor of Library & Information Science

I - Semester

109 13

INFORMATION PROCESSING - I: CLASSIFICATION THEORY

Reviewer	
Dr. AR. Balasubramanian	Former Librarian, Madurai Kamaraj University, Madurai

Author

Rajeev Garg, *Academic Author*

Units (1-13)

Vikas® is the registered trademark of Vikas® Publishing House Pvt. Ltd.

VIKAS® PUBLISHING HOUSE PVT. LTD.
E-28, Sector-8, Noida - 201301 (UP)
Phone: 0120-4078900 • Fax: 0120-4078999
Regd. Office: 7361, Ravindra Mansion, Ram Nagar, New Delhi 110 055
• Website: www.vikaspublishing.com • Email: helpline@vikaspublishing.com

Work Order No. AU/DDE/DE1-484/Printing of Course Materials/2019 Dated 08.07.2019 Copies-500

SYLLABI-BOOK MAPPING TABLE

Information Processing - I: Classification Theory

Syllabi	Mapping in Book
BLOCK I: THEORY OF CLASSIFICATION **Unit I:** Classification: Need and Purpose of classification – Basic concepts and terminologies – Species of Classification Schemes **Unit II:** Knowledge classification – Universe of subjects – Development and modes of formation of subjects. **Unit III:** Knowledge Classification and document classification – Physical arrangement of documents – Notation – Functions – arrays **Unit IV:** Theory and Development - General Theory: Normative Principles	**Unit 1:** Introduction to Classification Theory **(Pages 1-17)** **Unit 2:** Classification of Knowledge **(Pages 18-41)** **Unit 3:** Knowledge Organization **(Pages 42-70)** **Unit 4:** Theory and Development: An Overview **(Pages 71-80)**
BLOCK II: FUNDAMENTAL CATEGORIES **Unit 5:** Fundamental categories – Facet analysis – Principles of inversion and facet sequence – Principles of helpful sequence. **Unit 6:** Canons of Classification – Postulates and Postulation Approaches – Zone analysis, Systems and Specials Phase analysis **Unit 7:** Notation and Construction of Classification Number - Need, Purpose, Types and Qualities **Unit 8:** Common Isolates – Standard Sub Division - Devices in Library Classification	**Unit 5:** Overview of Fundamental Categories **(Pages 81-92)** **Unit 6:** Canons of Classification **(Pages 93-127)** **Unit 7:** Notation and Construction of Classification Number **(Pages 128-142)** **Unit 8:** Common Isolates **(Pages 143-158)**
BLOCK III: CLASSIFICATION SCHEMES **Unit 9:** Schemes of library classification – Historical development – DDC, UDC, CC **Unit 10:** Enumerative and Analytico Synthetic schemes – Comparative study of DDC & CC. 6 **Unit 11:** Call Number: Class Number, Book Number and Collection Number - Construction of Class Numbers **Unit 12:** Major Contributions by S.R. Ranganathan to classification Theory **UNIT 13:** Trends in Library Classification: KOS in the Internet world, Ontology, Folksonomy. Taxonomy Categories.	**Unit 9:** Schemes of Library Classification **(Pages 159-190)** **Unit 10:** Enumerative and Analytico-Synthetic Schemes: A Comparative Study **(Pages 191-199)** **Unit 11:** Call Number, Class Number and Book Number **(Pages 200-218)** **Unit 12:** Ranganathan's Contribution to Classification Theory **(Pages 219-229)** **Unit 13:** Trends in Library Classification **(Pages 230-240)**

CONTENTS

INTRODUCTION

NOTES

In popular usage, the term information refers to facts and opinions provided and received during the course of daily life: one obtains information directly from other living beings, from mass media, from electronic data banks, and from all sorts of observable phenomena in the surrounding environment. A person using such facts and opinions generate more information, some of which is communicated to others during discourse, by instructions, in letters and documents, and through other media. In treating the basic elements of information processing, it distinguishes between information in analogue and digital form, and it describes its acquisition, recording, organization, retrieval, display, and techniques of dissemination.

Information processing is the change (processing) of information in any manner detectable by an observer. As such, it is a process that describes everything that happens (changes) in the universe, from a change in position (for example, the falling of a rock) to the printing of a text file from a digital computer system. In the latter case, an information processor is responsible for changing the form of presentation of that text file. Information processing may more specifically be defined in terms used by Claude E. Shannon (an American mathematician, electronic engineer, and cryptographer known as 'the father of information theory') as the conversion of latent information into manifest information. Latent and manifest information is defined through the terms of equivocation (remaining uncertainty, what value the sender has actually chosen), dissipation (uncertainty of the sender what the receiver has actually received) and transformation (saved effort of questioning - equivocation minus dissipation).

This book, *Information Processing - I: Classification Theory*, is divided into fourteen units that follow the self-instruction mode with each unit beginning with an Introduction to the unit, followed by an outline of the Objectives. The detailed content is then presented in a simple but structured manner interspersed with Check Your Progress Questions to test the student's understanding of the topic. A Summary along with a list of Key Words and a set of Self-Assessment Questions and Exercises is also provided at the end of each unit for recapitulation.

BLOCK - I
THEORY OF CLASSIFICATION

UNIT 1 INTRODUCTION TO CLASSIFICATION THEORY

Structure

1.0 INTRODUCTION

The term 'information' refers to facts and views expressed and received during the course of daily life. Information processing is defined as the process of acquiring, recording, presentation and spread of information. However, in recent times, this term has often been applied specifically, to computer-based operations.

1.1 OBJECTIVES

After going through this unit, you will be able to:

- Define the term library classification
- Identify the components of library classification
- Discuss the purpose and objectives of library classification
- List the general classification systems
- Explain the types of library classification scheme
- State the terms generally used in library classification

1.2 LIBRARY CLASSIFICATION: BASIC CONCEPTS AND TERMINOLOGIES

NOTES

The term "classification" is a derivation from the Latin word "Classis" which connotes 'grouping'. Classification is a procedure of grouping similar items and objects and is essential in formulating groups that is known as classifying which results in classification. This process helps a user to arrange, organize and make a logical sense of articles which also assists the user to locate them in an easy manner. Classification is the ability to distinguish objects through their similarities and dissimilarities which is distinct in their identities for human beings.

Classification is one of the oldest and most prominent knowledge organizational tools. It is used in libraries, information centres, and other institutions for organizing books, journals, newspaper, thesis, magazine and so forth. It is a system by which library materials are arranged according to subjects or class numbers or author of the books. The Library Classification system uses a notational system that represents the order of the subject on the library and help users to easily find materials on the shelves. It brings the same subject books together and separates the unrelated subjects.

Library classification: It is the systematic arrangement of books and other materials on shelves or of catalogue and index entries in the manner which is most useful to those who read or who seek a definite piece of information on a library.

Library classification can also be considered to be a process of putting books and other reading material on a subject in a logical sequence on the shelf, which could be of immense help to the users. It requires an adept study and practice in the technique of classification of books, knowledge of the details and handling of the scheme of classification.

1.2.1 Components of Library Classification

Library classification is a process of translating the specific subject of a book into an artificial language of ordinal numbers, which in classificatory language are helpful in arriving at a logical arrangement. The essential components of a scheme of library classification are the following:

1. **Notation:** It is a set of symbols which stands for a class or a subject, for example, philosophy and literature and its sub-divisions like ethics, English literature representing a scheme of classification. For the purpose of arranging books, use of names of the subjects, broad or specific in natural language would neither be practicable nor convenient so these are translated into artificial language of ordinal numbers.
2. **Form Division:** Knowledge may be presented in one form or the other, the form could be textbook, manual, history, dictionary and encyclopaedia. These forms or styles of presenting knowledge of a subject could be commonly applied to any subject. Book classification takes care of

representing form in the Call Number. The numbers representing the forms of books are called form divisions. They are also known as common sub-divisions or common-isolates.

3. **Generalia Class:** There are certain books such as encyclopaedias, bibliographies and collected writings of an author which cannot be classified under any specific subject since they cover all subjects; hence, are classified under the Generalia Class.
4. **Index:** Index is an essential component of a scheme of Library Classification which is provided at the end of the scheme. It is of immense value to the members in their handling of a classified part of the catalogue.
5. **Call Number:** In classifying, each book is provided with a distinguished number specified to it which can be used for calling the book from the stacks and replacing it on its return to its right place. It is known as a Call Number.

1.2.2 Purpose and Need of Library Classification

Let us study the purpose and objectives of library classification.

Objectives

The need for library classification can be understood through its objectives. The main objective of library classification is to arrange the library documents in afiliatory sequence for the convenience of both the readers and the staff in the library. In fact, According to Dr. S.R. Ranganathan, library classification mechanizes the correct placement of library documents after use, fixes the most helpful place for a newly added document or a book amongst the other books available in the library on a similar subject and files the most helpful place for the first document on such other already existing subjects which are related to it. For this purpose, the class number must be coextensive with the subject of a document and easy subject must be individualized to the extent that no other subject must share the same class number.

1. **It brings like books together:** Classification arranges books in an order most convenient to the readers and the librarians. Readers should find all

NOTES

the related books together and librarians should use minimum time and energy in locating the documents. Classification brings together all the books on the same subject. Not only that, books on different branches of the subjects are also collated in a way that their mutual relationship is clearly displayed.

2. **It saves time:** Classification is a great time saving device for readers, as well as librarians and, thus, fulfils the demand of the fourth law of library science. The arrangement by subject, a natural consequence of library classification, saves a lot of time of the readers as well as of the staff, by bringing together all the related documents.
3. **It reveals the weakness and strength of the collection:** As classification arranges books on shelf by subject, it clearly shows which subjects have a good collection, and which subjects require more attention. In this way, it facilitates the book selection process and helps in developing all round collection of the library. Similarly, it assists the librarians in making up their collection, for the departmental or branch libraries or lending centres, from the central stock.
4. **It helps in bibliographic research:** Classification is of value in bibliographic research as it helps in the compilation of bibliographies, catalogues and union catalogues.
5. **It helps in stock verification:** Classification plays a significant role in the stock taking procedure. Generally, verification of stock is done through a shelf list, which is arranged in a classified order. Books on the shelf are also arranged in the same order. In the stock taking procedure, a person on the shelf goes on calling the call number of the books while the other person, holding the shelf list goes on pushing the relevant cards forward. Thus, the process of stock taking is completed within a relatively short time.

Library classification assists the librarian to make available the requisite book to the reader in the shortest possible time. The purpose of any library classification scheme is to allow libraries to arrange the documents in a sequence that will be of immense help to the readers. The library classification scheme offers the leaders a basis for organizing books and other reading material so that these can be used by the readers as and when they desire. A variety of classification schemes have been developed in various countries throughout the world to maintain the library collections in the most helpful manner possible.

Purpose of Library Classification

The following are the main purposes of library classification:

1. **Helpful sequence:** Classification helps in organizing the documents in a method most convenient to the users and to the library staff. The documents should be systematically arranged in classes based on the mutual relationship between them which would bring together all closely related classes. The

basic idea is to bring the like classes together and separate these from unlike classes. The arrangement should be such that the user should be able to retrieve the required document, as a result, it will make a helpful sequence.

2. **Correct replacement:** Documents whenever taken out from the shelf should be kept back in their proper places. It is essential that library classification should enable the correct replacement of documents after they have been returned from use. This would require a mechanized arrangement so that arrangement remains permanent.
3. **Mechanized arrangement:** It means to adopt a particular arrangement suitable for the library so that the arrangement remains permanent. The sequence should be determined once for all, so that one does not have to pre-determine the sequence of documents once again when these are returned after being borrowed.
4. **Addition of new document:** The library would acquire new documents from time to time. Therefore, library classification should help in finding the most helpful place for each of those among the existing collection of the library. There are two possibilities in this regard. The new books may be or a subject already provided for in the scheme of library classification, or it may be or a newly emerging subject that may not have been provided in the existing scheme.
5. **Withdrawal of document from stock:** In this case, the need arises to withdraw a document from the library collection for some reason, and then library classification should facilitate such a withdrawal.
6. **Book display:** Display is adopted for a special exhibition of books and other materials on a given topic. The term is used to indicate that the collection in an open access library is well-presented and guided. Library classification should be helpful in the organization of book displays.
7. **Other purposes:**
   - Compilation of bibliographies catalogues and union catalogues
   - Classification of information
   - Classification of reference queries
   - Classification of suggestions received from the users
   - Filing of non-book materials such as photographs, films and others

1.3 LIBRARY CLASSIFICATION SYSTEMS

A classification is a tool for the organization of the phenomena of the universe or any of its parts or constituents. It groups objects into categories/classes based on shared properties with the purpose of bringing like items together. A modern library classification is a classification of knowledge as it is contained in documents of all

NOTES

sorts. It came into being for the purpose of arranging and retrieving information resources. In libraries, later, it was used for arranging classified catalogues and other information retrieval tools such as bibliographies. A modern library classification is more than knowledge classification, and, moreover, grouping it has many intellectual and mechanical functions to perform. Since their modern origin in the 1870s, many library classification systems have been designed to organize and access knowledge in libraries.

1.3.1 General and Special Classifications

A library classification may be general or special in coverage of subject areas. A general classification covers all subjects in the universe of knowledge. A special classification concentrates on a narrower range of topics, or the goods manufactured or services provided by the organization for which the classification has been developed. A special classification also refers to a classification of documents by form such as government reports, fiction, maps, or music. Such a classification is for micro-documents and in-depth subjects.

- The taxonomy of the different types of classification has been expanded and systematized by Koch et al. (1997) as follows: universal schemes, national general schemes, subject specific schemes, and home-grown schemes. Universal schemes are intended to classify the entire universe of human knowledge for use by anyone, anywhere. Examples are the Universal Decimal Classification (UDC), the Colon Classification (CC), the Bliss Bibliographic Classification (BC), the Dewey Decimal Classification (DDC), and the Library of Congress Classification (LCC). National general schemes are universal in subject coverage, but intended for use in a single country. Examples are the Nederlandse Basisclassificatie (BC), the Sveriges Allmáma Biblioteksfórening (SAB), and the Nippon Dewey. This category may also include translated versions of the DDC in various languages incorporating provisions for the classification of local material. Subject specific schemes are designed for use by a particular subject community or domain. Examples are the National Library of Medicine (NLM) scheme for medicine, Iconclass for art resources, Moy's Law Classification, and the London Education Classification, among many others. Home-grown schemes are those devised for use in a particular service or retrieval system or in a library. Examples are Yahoo!'s categories and reader-interest classifications. There is an abundance of homemade library classifications, but these do not survive long in the era of standardized systems.
- On the other hand, although the idea of special or subject specific classifications presupposes a greater level of detail, some general classifications, notably the UDC, LCC, and BC-2 (Bliss bibliographic classification, second edition) have been developed in sufficient detail to enable them to be adapted to moderately special collections. Thus, the

debate between special and general classification is inconclusive. Ranganathan visualized his Colon Classification as a trunk of an elephant: nimble enough to pick up a small twig and strong enough to carry a heavy log of wood (Ranganathan, 1964). The Library of Congress Classification, with its 21 main classes in 29 parts bound in 50 volumes, is *de facto* a confederate of special classifications. The UDC, in its (now ceased) full edition, was issued in series of fascicules suitable for information centres and special collections.

Some of the main general classification systems are the following:

- Dewey Decimal Classification (1876+) / by Melvil Dewey
- Universal Decimal Classification (1905+) / FID (International Federation for Information and Documentation), now UDCC (Universal Decimal Classification Consortium)
- Expansive Classification (EC, 1892) / by C.A. Cutter
- Subject Classification (SC, 1906-1939) / by J.D. Brown
- Bibliographic Classification (BC, 1940-1953) / by H.E. Bliss
- Colon Classification (1933-1987) / by S.R. Ranganathan
- Bibliothecal Bibliographical Klassification (BBK, 1960-1970) / by VINITI (All-Russian Institute for Scientific and Technical Information), Russia
- Rider's International Classification (RIC, 1961) / by Fremont A. Rider
- Information Coding Classification (ICC, 1970) / by I. Dahlberg
- Bibliographic Classification second edition (BC-2, 1977-) / by J. Mills and V. Broughton
- Broad System of Ordering (BSO, 1978) / by Eric Coates

Of these, the DDC, UDC, and LCC are considered the big three systems. The CC and BC-2 are ideal and scientifically sound systems, arguably more complex and grounded than the previous three (see for instance Ranganathan, 1967). However, they have not been implemented and used as widely as the DDC and UDC due to lack of editorial support or a more aggressive marketing of institutions such as OCLC (Online Computer Library Center). The BSO and ICC are not shelf classifications, whereas the fate of the Russian BBK is not known. The rest, namely EC, SC, BC, and RIC, are now only of historical interest.

- Over the years, the features of these classifications have evolved and with experience been standardized. A library classification is a system having mutually related components or subsystems with the objective of organizing knowledge in libraries. It has its anatomy (hardware) showing its visible and invisible components, each of which has its supporting functions (physiology).

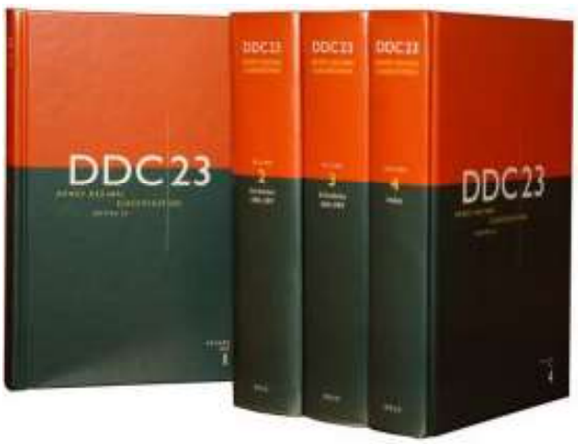
1.4 TYPES OF LIBRARY CLASSIFICATION SCHEMES

NOTES

On one extreme, a library classification scheme can be completely enumerative where every subject and class ID listed with a pre-defined notation and the classifier has simply to choose a class and the corresponding notation. On the other hand, a classification scheme can be fully faceted, where the classifier has to follow a set of rules to construct a class number. In between these two extremes, there is also a classification scheme that to some extent is enumerative but also makes provision for some sort of synthesis to build the class number. These are called Analytico-Synthetic Classification Schemes.

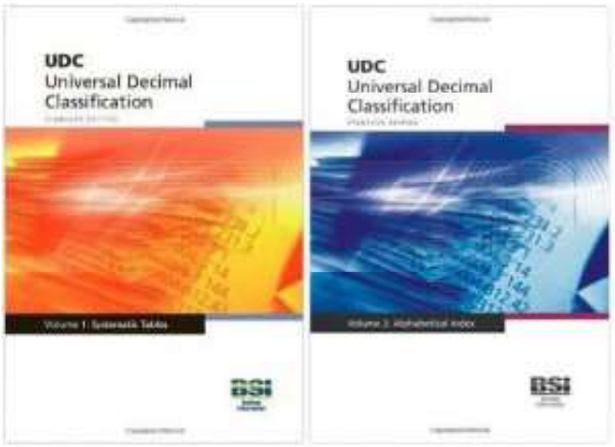
1. Enumerative Classification Schemes

An Enumerative Library Classification Scheme is a scheme where all the possible classes are enumerated according to certain characteristics. There is a top down approach whereby a series of subordinate classes are produced and where both simple and complex subjects are listed. The advantage of this scheme is that the structure of the scheme is shown by the notation as far as practicable. Users can easily find the coordinate and subordinate classes and can make a map of the subject. The disadvantage is that it is difficult to accommodate new subjects and frequent revisions may be required. An enumerative classification scheme, in some cases, displays hierarchical structures of notation. The basic tenet of this scheme is that all the possible subjects and topics are listed along with a predefined class number and, therefore, the classifier does not have to create any class number such as the Dewey Decimal Classification.

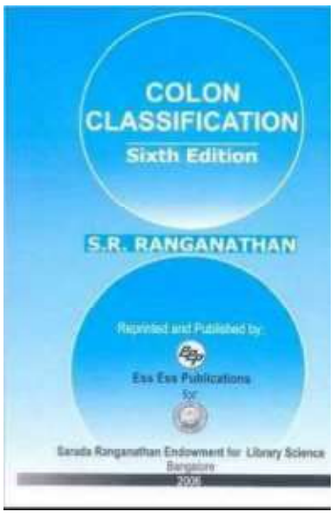


2. Analytico-Synthetic Classification Scheme

Analytico-Synthetic Library classification schemes resolve some of the problems of enumerative classification schemes. The concept behind this scheme is that the subject of a given document will be divided into its constituent elements and then



the classification scheme will be used to find notations for each element, which will then be combined according to the prescribed rules to prepare the final class number. This scheme overcomes the two major problems of enumerative classification schemes, such as by providing various tables, specific notational symbols and rules, they avoid the necessity for a long list of classes and, thus, produce a smaller classification scheme in size. They also provide flexibility to users as specific numbers can be built and the classifier is not restricted by the availability of a specific subject. Nevertheless, it makes classifiers job complex since they have to construct the class numbers as opposed to just selecting one from a list like Universal Decimal Classification.



3. Faceted Classification Scheme

A Faceted Classification Scheme is on the other extreme of the scale since instead of listing all the classes and the corresponding numbers, it lists the various facets of every subject or main class and provides a set of rules for constructing class numbers through facet analysis. The concept of facet analysis was proposed by Dr. S. R.

NOTES

Ranganathan and was used in his faceted classification scheme called Colon Classification. The basic idea is that any component or facet of a subject can fit into five fundamental categories: personality, matter, energy, space and time. These categories have become the major focus of classification research from 1930 onwards resulting in Colon Classification.

4. Dewey Decimal Classification

The Dewey Decimal Classification (DDC) system is the world's most widely used library classification system. American librarian and library educator Melville Dewey devised the system in 1873 while he was a student at Amherst College in Massachusetts. The Dewey Decimal system was first published in 1876 as "A Classification and Subject Index for Cataloguing and Arranging the Books and Pamphlets of a Library". It appeared in the form of a small book of 44 pages. The Decimal Classification Editorial Policy Committee (EPC) was established in 1937 to serve as an advisory body to the Dewey Decimal Classification. In 1988, Online Computer Library Center, Inc (OCLC) acquired the DDC. The editorial headquarters was located at the Library of Congress in the Decimal Classification Division. The editors prepare the proposed schedule revisions and expansions, and forward the proposals to EPC for review and recommended action. Nowadays, DDC is published by Online Computer Library Center, Inc in full and abridged editions. The abridged edition targets the general libraries having less than 20,000 titles. Both the full and abridged editions are available in print as well as in electronic version.

The Dewey Decimal Classification (DDC, also called the Dewey Decimal System) is a proprietary system of library classification developed by Melvil Dewey in 1876, and has since then been greatly modified and expanded through 22 major revisions, the most recent being in 2004. Now let us understand how it works.

The DDC attempts to organize all knowledge into 10 main classes. The 10 main classes are then further subdivided. Each main class has 10 divisions, and each division has 10 sections. Hence, the system can be summarized in 10 main classes, 100 divisions and 1,000 sections. DDC's advantage in choosing decimals for its categories allows it to be both purely numerical and infinitely hierarchical.

It also uses some aspects of a Faceted Classification Scheme, combining elements from different parts of the structure to construct a number representing the subject content (often combining two subject elements with linking numbers and geographical and temporal elements) and form of an item rather than drawing upon a list containing each class and its meaning.

Except for general works and fiction, works are classified principally by subject, with extensions for subject relationships, place, time or type of material, producing classification numbers of not less than three digits but otherwise of indeterminate length with a decimal point before the fourth digit, where present (e.g. 330 for economics + 9 for geographic treatment + 4 for Europe = 330.94

European economy; 973 for United States + 05 form division for periodicals = 973.05, periodicals concerning the United States generally).

Books are placed on the shelf in increasing numerical order; the whole number to the left of the decimal is in counting order, while the digits to the right of the decimal are compared one digit at a time, with a blank coming before zero. (Example: 050, 220, 330.973, 331 etc.) When two books have the same subject and, therefore, the same classification number, the second line of the call number, which usually has the first letter or first several letters of the author's last name (or the title if there is no identifiable author), is placed in an alphabetical order.

It is a common misconception that all books in the DDC are non-fiction. The DDC has a number for all books, including those that generally become their own section of fiction. If DDC rules are strictly followed, American fiction is classified in 813. Most libraries create a separate fiction section to allow shelving fiction in a more generalized fashion than Dewey provides for, or to avoid the space that would be taken up in the 800s.

DDC compared to other classification systems

DDC's numbers formed the basis of the more expressive but complex Universal Decimal Classification, which combines the basic Dewey numbers with selected punctuation marks (comma, colon, parentheses and others). Besides its frequent revision, DDC's main advantage over its chief rival—the Library of Congress Classification System developed shortly afterward—is its simplicity. Thanks to the use of pure notation, a mnemonics system and a hierarchical decimal place system, it is generally easier to use for most users.

DDC and UDC are also more flexible than Library of Congress Classification because of greater use of facets (via auxiliary tables) while Library of Congress Classification is almost totally enumerative.

On the flip side, DDC's decimal system means that it is less hospitable to the addition of new subjects, as opposed to the Library of Congress Classification which has 21 classes at the top level. Another side effect of this is that DDC notations can be very much longer compared to the equivalent class in other classification systems.

Another disadvantage of DDC is that it was developed in the 19th century, by essentially one man, and was built on a top down approach to classify all human knowledge which made it difficult to adapt to changing fields of knowledge. In contrast, the Library of Congress Classification system was developed based mainly on the idea of literary warrant; classes were added (by individual experts in each area) only when needed for works owned by the Library of Congress. As a result, while the Library of Congress Classification System was able to incorporate changes and additions of new branches of knowledge, particularly in the fields of engineering and computer science (the greater hospitality of the Library of Congress Classification was also a factor), DDC has been criticized for being inadequate for

NOTES

covering those areas. As a result, most major academic libraries in the US do not use the DDC because the classification of works in those areas is not specific enough.

The Library of Congress Classification System is not without problems because each area is developed by an expert according to demands of cataloguing, there is little consistency. It is also highly US-centric (more so than DDC) because of the nature of the system, and compared to DDC and UDC it has been translated into far fewer languages.

1.5 BASIC TERMINOLOGY AND HISTORICAL PERSPECTIVE

Library classification emerged as an academic discipline about 125 years ago. Its teaching and research has gained momentum comparatively recently. Its necessity has been well acknowledged, though, its terminology is not well settled. One of the principal contributions of Professor S.R. Ranganathan to library classification, along his intuitive and intellectual contributions, is the terminology for expression of thoughts. The evolution of the terminology of library classification in India came besides the evolution of the theory and practice of classification. It grew at a faster pace flanked by the sixties and eighties. This is due to rigorous developmental research in the field. Extend of jargons in classification to an international circle can be said to be fostered through the CRG (Classification Research Group) in London. The CRG members have communicated with Ranganathan and gravely examined each of his conditions. They refashioned few of them and retained several of them and provided descriptive notes to the definitions and then extended them to library schools in Britain and other countries. The First International Revise Conference held at Dorking principally supported through CRG saw to it that a comprehensive glossary of conditions was urbanized for exploit at the international stage. The glossary was compiled through B.C. Vickery for the benefit of the new audience. This movement was extremely well complimented through the FID (International Federation for Fact and Documentation/Federation International Fact et de Documentation) Congress, and FID/CA (Committee on Classification Theory) in which Ranganathan himself was extremely involved in the propagation of thoughts. The growth of the conditions in the second, third and fourth revised conferences indicated a steady improvement in classification research. Today, we can discover that the contribution of Ranganathan to classification terminology is approximately an integral section of any classification research, teaching, studying or script.

1.5.1 Relation to other Terminologies in Library Science

Classification is a basic discipline in the field of library and fact science and pervades all the other sub-divisions of library science. Therefore, the terminology of library classification is an interactive terminology. The symbiotic nature of classification

and cataloguing has taken a general link in relation to subject indexing conditions. Several of the verbal plane rules of classification terminology can also act as rules for cataloguing terminology. In relation to reference service, classification gives the analytic and synthetic framework for; efficient handling of reference job and service. Several of the classification conditions can be used. To a certain extent, management characteristics of libraries can be explained by classificatory terminology. To conclude, classificatory terminology is crucial to the evolution of the discipline of library science. It can be measured, thus to say, that the intellectual framework of library science lies in classificatory terminology.

1.5.2 Classification Terminology: Indian School of Idea

In the past 100 years, numerous schemes of library classification have been introduced in the world.

The Common Assembly of FID, at its meeting held in Brussels on 16 September 1955, adopted a settlement to the effect that necessary steps should be taken to prepare a glossary of classification conditions. As a first step in this direction, it was recommended and agreed in 1957 that each school of idea on the theory of classification should prepare the glossaries of conditions used through it and finally these glossaries should be collated to arrive at a Universal Comprehensive Glossary of all the classification conditions.

Further, with increase in literacy and the phenomenal expansion and augment in the number of libraries in India, there was requirement of having an authoritative and comprehensive glossary for the guidance of technological staff in libraries. The Documentation Sectional Committee of the Indian Standards Institution (now recognized since Bureau of Indian Standards) took up the preparation of a glossary of classification conditions. This glossary of classification conditions present in the Indian School of Idea has been arrived at through three levels. In the first level, not only conditions of the Indian School but also of all other schools of idea in English speaking countries were taken. The definitions incorporated in the first draft were taken from the ALA Glossary and the jobs of Henry Evelyn Bliss, Donker Duyvis, S.R.Ranganathan, W.C. Berwick Sayers, B.C. Vickery and Frand S Wanger, Jr. In the second level, the draft incorporated only those conditions that were measured through the Sectional Committee fit for retention. These incorporated few alternate conditions and few alternate definitions. At the third and final level, suggestions received as a result of wide circulation of the second draft were measured and the final average was prepared.

This average IS: 2.550-1963, contains 23 chapters under three broad headings: classification in common, universe for library classification, and classification of the universe of knowledge. These core/vital concepts of classification are enumerated under the following headings: Universe and entity Cluster and class Attributes and features Disciplines and vital subjects Categories, facets and isolates Arrays and chains Schedules for classification Species of classification for subjects Notation.

NOTES

1.5.3 Classification Terms

As with other areas of cataloguing, there are many specific terms that are used to describe the various processes needed for assigning classification numbers. Here is a list of terminology that will be helpful in understanding the area of cataloguing.

Non-fiction: This refers to library items that contain primarily factual information. The non-fiction collection is the part of the library collection that classification systems are designed to organize.

Fiction: This refers to library materials that deal with imaginary characters and events. Fiction collections are not usually organized with a classification system. An exception to this might be classic literature, which is sometimes included in the non-fiction section.

Schedules: These are the part of a classification system that lists known topics and assigns basic numbers or alphanumerical combinations to them. The schedules are where cataloguers look when creating a classification number for any library item.

Tables: The DDC contains four tables of information that can be used in creating numbers from the schedules. These tables are needed to modify numbers from the schedules, creating more specific, topical numbers.

Summaries: In the DDC, everything is organized in groups of 10. DDC has included in its classification book three summaries that show how information is organized in this classification system. The first summary lists the 10 main classes of information, the second summary lists the one hundred divisions of those classes, and the third summary lists the one thousand sections of those classes.

Notation: The number, or letter and number combination, that is, developed using the information given in a classification system (i.e. the schedules and tables of the DDC).

Book Number: This refers to the combination of letters or letters and numbers that are used to indicate an individual work in the library. The book number may consist of several parts: an indicator for the author (i.e. author's last name); an indicator for the title (when an author has published more than one work in the same subject area); the date of publication (i.e. 1999); a copy number if there is more than one copy of this particular work in the collection (i.e. copy 2). While the use of the term 'book' seems to indicate that this can only be used on print materials, it is a carryover from days when library collections consisted solely of print items, and book numbers can be developed for any type of library materials.

Call Number: This is the location or address of an item on the library shelves. The call number is made up of the notation (the number indicating the subject of the book) and the book number (indicating the author and information about that particular copy). There should be a unique call number for each individual item in a library collection. This can be done through the use of indicators for the title, date and copy number in the book number.

Check Your Progress

1. Define the term 'library classification'.
2. Name the general library classification systems.
3. List the essential components of a scheme of library classification.

1.6 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. Library classification is the systematic arrangement of books and other materials on shelves or of catalogue and index entries in the manner which is most useful to those who read or who seek a definite piece of information on a library.
2. The general library classification systems are the following:
   - Dewey Decimal Classification (1876+) / by Melvil Dewey
   - Universal Decimal Classification (1905+) / FID (International Federation for Information and Documentation), now UDCC (Universal Decimal Classification Consortium)
   - Expansive Classification (EC, 1892) / by C.A. Cutter
   - Subject Classification (SC, 1906-1939) / by J.D. Brown
   - Bibliographic Classification (BC, 1940-1953) / by H.E. Bliss
   - Colon Classification (1933-1987) / by S.R. Ranganathan
   - Bibliothecal Bibliographical Klassification (BBK, 1960-1970) / by VINITI (All-Russian Institute for Scientific and Technical Information), Russia

NOTES

3. The essential components of a scheme of library classification are the following:
   - Notation
   - Form division
   - Generalia class
   - Index
   - Call number

1.7 SUMMARY

- Classification is a procedure of grouping similar items and objects and is essential in formulating groups that is known as classifying which results in classification.
- Classification is one of the oldest and most prominent knowledge organizational tools. It is used in libraries, information centres, and other institutions for organizing books, journals, newspaper, thesis, magazine and so forth.
- The main objective of library classification is to arrange the library documents in afiliatory sequence for the convenience of both the readers and the staff in the library.
- A classification is a tool for the organization of the phenomena of the universe or any of its parts or constituents.
- An Enumerative Library Classification Scheme is a scheme where all the possible classes are enumerated according to certain characteristics.
- Analytico-Synthetic Library classification schemes resolve some of the problems of enumerative classification schemes.
- A Faceted Classification Scheme is on the other extreme of the scale since instead of listing all the classes and the corresponding numbers, it lists the various facets of every subject or main class and provides a set of rules for constructing class numbers through facet analysis.
- Library classification emerged as an academic discipline about 125 years ago. Its teaching and research has gained momentum comparatively recently.
- Classification is a basic discipline in the field of library and fact science and pervades all the other sub-divisions of library science. Therefore, the terminology of library classification is an interactive terminology.
- As with other areas of cataloguing, there are many specific terms that are used to describe the various processes needed for assigning classification numbers.

NOTES

1.8 KEY WORDS

- **Taxonomy:** It is the study of the general principles of scientific classification: systematics.
- **Dewey Decimal Classification:** It is the world's most widely used library classification system.
- **Call Number:** This is the location or address of an item on the library shelves.

1.9 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions

1. Write a short note on the purpose and objectives of library classification.
2. What is a library classification system?
3. Mention the terms generally used in library classification.

Long Answer Questions

1. Discuss the types of library classification schemes.
2. How does the Dewey Decimal Classification System works?
3. Explain the history of the development of library classification as a discipline.

1.10 FURTHER READINGS

Parkhi, RS. 1960. *Library Classification: Evolution and Dynamic Theory*. Bombay: Asia Publishing House.

Raju A. 1991. *Universal Decimal Classification.* Madras: T.R. Publishers.

Ranganathan SR. 1963. *Colon Classification*. Sixth Edition. Bombay: Asia Publishing House.

Ranganathan, SR. 1965. *Prolegomena to Library Classification,* Second Edition. London: Library Association.

UNIT 2 CLASSIFICATION OF KNOWLEDGE

NOTES

Structure

2.0 INTRODUCTION

Knowledge is the sum of known and unknown entities and is the result of human endeavours and past experiences accumulated through generations. It is passed on from generation to generation and from civilization to civilization. The distinction is drawn merely between observing, perceiving, or even describing things and truly knowing them. To know implies a process of integration of facts about objects and the context in which the objects and processes exist. Even in colloquial usage, knowledge about someone or something is always expressed in terms of deep relationships and meanings as well as its place in time and space.

To know cars means not only understanding car mechanics but also knowledge of the interplay of the mechanical processes and perhaps even factors such as aesthetics, economics and psychology.

In this unit, you will study about knowledge classification, universe of subjects and development and modes of formation of subjects.

2.1 OBJECTIVES

After going through this unit, you will be able to:

- Discuss knowledge classification
- Explain knowledge organization in CC and DDC
- Describe development and modes of formation of subjects

NOTES

2.2 KNOWLEDGE CLASSIFICATION

The process of knowledge discovery and creation in science has traditionally followed the path of systematic exploration, observation, description, analysis, and synthesis and testing of phenomena and facts. All this is conducted within the communication framework of a particular research community with its accepted methodology and set of techniques. We know the process is not entirely rational but often is sparked and then fueled by insight, hunches, and leaps of faith (Bronowski, 1978). Moreover, research is always conducted within a particular political and cultural reality (Olson, 1998). Each researcher and, on a larger scale, each research community at various points must gather up the disparate pieces and in some way communicate what is known, expressing it in such a way as to be useful for further discovery and understanding. A variety of formats exist for the expression of knowledge-e.g., theories, models, formulas, descriptive reportage of many sorts, and polemical essays 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 improved 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. Karl Popper sees knowledge as three worlds namely, physical, subjective and objective knowledge. The growth and development of knowledge structure 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 such as sociology of science, literature and reading. Finally, knowledge utilization is the ultimate goal, which provides 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.

NOTES

The word 'knowledge' means an assured belief or that which is known. In the process of knowing, there are two parties—the knower and the knowee. Present day knowledge is very vast and its growth is a continuous process. No human brain has the capacity to understand anything more than a very small portion of it. Knowledge is essentially communicable. The principal mechanism for the transmission of knowledge is graphic records. The accumulated knowledge in any form must be communicated to those who need it. Every member of the society should have an open and easy access to the accumulated knowledge in his field of interest. Learning must go on ceaselessly for further advancement of knowledge necessary for enlightenment and development of a community. According to Dr S R Ranganathan, knowledge is "a sum total of information conserved by civilization".

The term *knowledge organization systems* is intended to encompass all types of schemes for organizing information and promoting knowledge management. Knowledge organization systems include classification schemes that organize materials at a general level (such as books on a shelf), subject headings that provide more detailed access, and authority files that control variant versions of key information (such as geographic names and personal names). They also include less-traditional schemes, such as semantic networks and ontologies. As knowledge organization systems are mechanisms for organizing information, they are the core of every library, museum and archive.

Webster's New International Dictionary of English Language defines knowledge as, "familiarity gamed by actual experience, practical skill, technical acquaintance." It has also been defined as, "acquaintance with fact, the state of being aware of something or of possessing information, hence scope of information."

Oxford English Dictionary defines knowledge in various ways but the most relevant definition to this study is the following "(a) intellectual acquaintance with perception of fact or truth, clear and certain mental apprehension, the fact, state or condition of understanding (b) acquaintance with a branch of learning, a language or the life, theoretical or practical understanding of an art, science, industry."

Random House Dictionary (RHD) of the English Language, defines knowledge as (a) acquaintance with facts, truths or principles, as from study or investigations (b) as familiarity with a particular subject, branch of learning and so forth".

A precise single definition of knowledge, universally acceptable to all and in all contexts, is impossible. Scholars who are interested in the study of knowledge, as a resource, as a philosophical concept, as social wealth and so forth 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 the following:

- 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'.

NOTES

Collins Dictionary of English Language defines knowledge in the following ways:

- The facts, feeling and experiences known by a person or group of people.
- The state of knowing.
- The awareness, consciousness or familiarity gamed by experience or learning.
- Evaluation or informed learning.
- Specific information about a subject.

Peter Berger (Professor of Sociology at Boston University and Director of the Institute for the Study of Economic Culture) and Thomas Luckmann (Professor of Sociology at the University of Constance, German) state that "knowledge is the certainty that phenomena are real and that they possess certain characteristics."

In this definition, the two words 'certainty' and 'real' pose the following problems;

(a) How the certainty was reached

(b) What reality means

(c) Whether it includes only actual, almost tangible and objectified items or also conceptual statements.

Thus, different authors have defined knowledge in different ways. It is the most prominent sort of information. It is the clear perception or learning gained through experience.

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 recognize. This means that we mentally process our experience, shaping it and giving it mental forms that we can identify. So we recognize

NOTES

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 organizations, it often becomes embedded not only in documents or repositories but also in organizational 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 organized 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 and so forth makes space for future growth.

2.2.1 Nature and Characteristics of Knowledge

When we talk of knowledge, we recognize 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 comprised increasingly of 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 utilization 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) invented from intense research

ostensibly for a nation's security; however, if used indiscriminately, would bring about total annihilation of all living beings.

Knowledge is the totality of what is known and is the creation of human mind. Knowledge has various characteristics. The characteristics of universe of knowledge are that it is infinite, continuum, turbulently dynamic, multidimensional and coherent.

NOTES

Infinite: Knowledge is enhancing constantly and eternally. The universe of knowledge includes all knowledge—past, present and future. There is a continuous development of universe of knowledge making it one continually infinite. What is already known is infinitesimal and what is to be known is infinite.

Continuum: The universe of knowledge tends always towards continuum. Continuum means that which have continuity.

Turbulently Dynamic: The universe of knowledge has a dynamic quality. A continuous cascade of new micro thoughts that are being produced by organized research makes the universe of knowledge a dynamic continuum. Hence, knowledge tends to be turbulently dynamic.

Manifold Multidimensional: Dimension is the degree of main classification of a system as fixed by the number of fit parameters necessary and sufficient to distinguish any one of its entities or parts from others. In the hierarchical structure of classification system, there are three areas of dimensions—facet, array and phase. Facet dimension may be of Personality, Matter, Energy, Space or Time. Number of characteristics used in the formation of an array is equivalent to the number of array dimensions. Phase is the component of a complex subject. Phase can be of a compound subject or complex subject.

Cumulative: Knowledge grows by cumulative process in which the new knowledge is dependent upon that is already in existence and in which new knowledge is gradually accumulated. Thus, the universe of knowledge has a cumulative characteristic.

Coherent: Each and every element in the universe of knowledge is inter-related and a change in one element will affect the denotation of (the whole).

Multidirectional: The growth of knowledge occurs not in a single direction, but in many directions. There are a variety of modes of formation of subjects. These have implications on the design methodology of schemes of classification Knowledge has to be properly organized. Classification schemes are used for the purpose of organization of knowledge

2.3 ORGANIZATION OF KNOWLEDGE

Organization signifies the organic structure of work in which all the elements are organized in such a manner as to make sense. The grouping of things in laboratories, book shops or in libraries is a necessity so that object can be used easily, smoothly

NOTES

and quickly. The purpose of organization of knowledge in libraries is to systematize it for smooth communication and circulation. A library, which is a pool of knowledge, is constantly spreading human thought and culture through its medium. It accumulates the conceivable literature in the form of books, reports, journals and other acoustic materials. The growth of knowledge, therefore, in every community is natural and spontaneous. If knowledge is organized in a helpful sequence, it would eliminate the unnecessary search and thereby save time and energy of the library users.

Knowledge organization is an interdisciplinary cultural activity, which adds informational value to collections containing knowledge. It assigns subject access points to items such that the needs of the user groups of the associated information system are served best. According to Anderson, knowledge organization is "The description of documents, their contents, features and purposes, and the organization of these descriptions so as to make these documents and their parts accessible to persons seeking them or the messages that they contain. Knowledge organization encompasses every type and method of indexing, abstracting, cataloguing, classification, records management, bibliography and the creation of textual or bibliographic databases for information retrieval". While discussing about knowledge organization, Berger Hjorland gives nine principles of Knowledge Organization They are the following:

(i) Naive-realistic subject analysis is not possible

(ii) Categorizations and classifications should unite related subjects and separate unrelated subjects

(iii) Different levels of ambition in knowledge organization exist

(iv) Any given categorization should reflect the purpose of that categorization

(v) Concrete scientific categorizations and classifications can always be questioned,

(vi) The concept of poly representation is important

(vii) Different sciences could be understood as different ways of organizing the same phenomena

(viii) The nature of disciplines varies, and

(ix) The quality of the knowledge production should be analysed

2.3.1 Knowledge Organization in Classification Schemes: Universe of Subjects

The fundamental technique adopted for the organization of knowledge in libraries is classification. According to Langndge, "Organization of knowledge is the most comprehensive term expressing the library function served by classification. It indicates the ability not only to pinpoint specific and precisely defined items of information, but also to demonstrate the complete range of subjects available in library and then relation to each other." Unless the resources are classified in the

library their full use is not possible. Classification gives meaning and life to documents and it alone personifies the accumulated documents making them communicable to those who use them. Thus, the essential function of classification is to organize **universe of subjects** as to make the retrieval of any desired subject or any filiatory sequence of subjects pinpointed, exhaustive and expeditious. Dalhberg says, "Classification is considered as identical with the organization of knowledge. Classification is thus a knowledge - directed activity, which may thus be considered as a subfield of the science of sciences, whose object of concern is human knowledge as such, from three points of view viz its totality, its elements and relationships between the elements in its totality, which in effect means systematising elements of knowledge with clear specification of their inter-relationships, however complex, a task to which classification should address itself."

As early as 1957, Shera observed that, "Man is at the beginning of a profound reorganization of his departmentalized structuring of knowledge. The old boundaries are crumbling—Sciences, the Social Sciences and the Humanities. The integration of knowledge and interdisciplinary cross fertilization have achieved a new popularity. In a limited sense, too, it is catalytic, for it can accelerate reaction whatever it serves. If it is true that recorded knowledge is autogenetic in that it begets more knowledge, then the librarian of the future will be regarded as the genetist of our intellectual life." Thus, classification of knowledge in documents is a process of grouping documents containing like divisions of knowledge and separating documents containing unlike divisions of knowledge. It is popularly known as subject classification of books in libraries. Library classification is another term assigned to it. For the purpose of classifying documents in the library, a number of schemes with different structures of universe of knowledge have been developed.

1. Knowledge Organization in Colon Classification (CC)

The purpose of library classification is to arrange the subjects in a linear sequence helpful to the majority of readers and to mechanize the arrangement by providing each subject a unique number. Classificationists have brought out a few general classification schemes. Dissatisfied with the existing schemes of library classification, S R Ranganathan devised a scheme based on synthetic or meccano principle. CC employs a scientific approach to classification based on normative principles, which are objectively applicable. Dr Ranganathan's dynamic theory of classification has given a scientific base to library classification. He has formulated a set of canons, normative principles and postulates, on which his scheme - CC is based.

The Madras Library Association first published the Colon Classification in 1933 It was improved, revised and updated continuously in different editions published at different intervals. Three versions of Colon Classification have been recognized CC-1, CC-2 and CC-3 belong to Version 1. This version was severely rigid though fully faceted. CC-4, CC-5 and CC-6 (including the reprint of 6th edition with annexure) belonged to Version 2 of CC. This version was a great improvement over the first one, but some rigidity remained with regard to levels of

NOTES

facet within a round. CC-7 belongs to version 3 of CC. It is considered a freely faceted scheme for library classification. It is certainly an advanced version. CC-7 is a freely faceted scheme. The schedules in CC-7 consist of certain standard unit-schedules, corresponding to standard pieces in a meccano set. By combining these standard unit schedules through various permutations and combinations, one can construct the class numbers for different subjects. The indicator digits serve as nuts and bolts. Thus, CC is the first scheme entirely based on analytico-synthetic principle. It is a scheme in which a compound subject is first analysed into its facets and then synthesized. Ranganathan is of the view that "All the editions of CC are fully analytico- synthetic. UDC has a slight touch of analytico-synthetic quality. It can be seen that the quality of a scheme being faceted implies it is being analytico-synthetic." It was supposed to be published in three volumes. But only volume-I of Colon Classification Edition 7 Schedules for Classification was published in 1987.

Basic Plan: The universe of knowledge is broadly divided at the first instance into Natural Sciences, Humanities and Social Sciences. Each of these broad divisions have been further divided into a set of main classes—the fairly homogeneous, conventional regions of knowledge, which form the first order array of classes and are mutually exclusive and totally exhaustive of the field of knowledge. Each Main class is divided further into facets by the application of different teams of characteristics. A few Main classes are first divided into canonical classes, i.e., classes reflecting no clear characteristics of division but which are homogeneous and recognizable classes. All facets are regarded as manifestations of five fundamental categories - Personality [P], Matter [M], Energy [E], Space [S] and Time [T]. Each facet contains a number of isolates. Each fundamental category has an indicator digit - comma for Personality, semicolon for Matter, colon for Energy, dot for S space and single inverted comma for Time. In practical classification, the fundamental categories are arranged after the basic facet denoting the basic subject in the order PMEST. The respective indicator digits are brought before the isolate numbers to obtain the ultimate class number. Documents having the same ultimate class numbers are further individualized using the book number. The facet formula for book number contains different facets representing characteristics like language, form, year of publication, volume number and so forth. Thus, the whole process is analytico-synthetic in character. The CC formulates the necessary grammar to construct class numbers for different subjects.

General divisions and Common isolates: CC-7 has a number of general divisions in different subjects and common isolates compared to its earlier edition. Driven by the idea that each isolate idea is capable of being a basic subject, hundreds of isolates treated previously as Personality and Energy isolates, have now been designated as basic subjects. The traditional main subjects and the basic subjects are separately listed out. The basic subjects include traditional main subjects, non- main subjects, systems, specials and others. Provision of a checklist of components for facet analysis is a new feature of seventh edition of CC. Environment divisions have been incorporated for the first time in this edition of

NOTES

CC. Explaining the need of their introduction, the author says, "The study of an entity-commodity, living organism, human being of a social group in extra normal environment is now being pursued to a considerable extent. It is helpful to bring together in each main subject the documents on the study of entities in each of the extra normal environment. These divisions have been derived on the basis of several characteristics, such as physical nature, chemical nature, meteorological feature, political, economic-social environment, language, religion, etc. Thus, environmented basic subjects are those which are studied under some extra normal environments."

As the isolates for Language, Space and Time are common for every Main class and do not change from subject to subject, they are enumerated once for all. When compared to the previous edition Space and Time isolates have been sharpened further. In CC-7, there has been an expansion in common isolates. There are two types of common isolates—Anterionsing common isolates and Postenorising common isolates. Anteriorising common isolates are those which cannot be designated on the basis of fundamental categories. They are used for documents, which require to be arranged anterior to ordinary documents on the subject of concern. Postenorising common isolates are used for documents, which do not require the need for anterior position. They are divided into common energy isolates, common matter property isolates and common personality isolates. The general divisions also include phase relation digits and indicator digits. Concerning the phase relations there are two new additions. Provision of a tool phase and change of the indicator digit for phase relation from 'O' (zero) to '&' (Ampersand). The different kinds of phase relations with their different levels and digits are as follows;

Kinds of phase relation

Intra-Array	*//Intra-facet//*	*Subject//*	*Phase relation*
t	J	a	General
u	k	b	Bias
v	m	c	Comparison
w	n	d	Difference
x	p	e	Tool
y	r	g	Influencing

The indicator digits have increased in number in CC-7 due to the increasing depth of the subjects embodied in the documents. These make the class number coextensive and expressive. The following are the indicator digits employed in the new edition.

Group A : Anteriorising Indicators:

* Asterisk	To indicate agglomerate formation and interpolation
← Backward Arrow	To indicate backward range
" Double Inverted Comma	To indicate common isolate facet

NOTES

Group B: Posteriorising Indicators:

& Ampersand	To indicate phase relation
'' Single inverted Comma	To indicate Time facet
. Dot	To indicate Space facet
: Colon	To indicate Energy facet
; Semi colon	To indicate Matter facet
, Comma	To indicate Personality facet
- Hyphen	To indicate Speciator of kind 1
= Equal to	To indicate Speciator of kind 2
+ Plus	To indicate the second and later part of the fraction of integral number or the second and later part of multinomial m (AD)
→ Foreword Arrow	To indicate foreword range

Notation: CC-7 uses a mixed notation. It makes use of 74 digits belonging to six species They are;

1 A - Z	26
2 Greek letter (Delta)	01
3 0-9	10
4 a – z (Excluding l, 1 & o)	23
5 Ordinary indicator digits (like), &, -, =, etc)	12
6 Indicator digits with anteriorising value (like ←, ")	02
	74

The ordinary indicator digits are ampersand, single inverted comma, dot, colon, semi colon, comma, hyphen, equal to, foreword arrow, plus and parentheses. The indicator digits with anteriorising value are asterisks, double inverted comma and backward arrow. The Roman capitals are used to denote the Main classes and the Roman small for common isolates. The Indo Arabic numerals are used decimally to denote different special isolates in different Main classes and the Roman small for common isolates. The Indo Arabic numerals are used decimally to denote different special isolates in different Main classes. When arranged in the ascending sequence of their ordinal value, all the above digits will stand in the following sequence)

&' ,,- = — +ab yz Ol 89AB MN YZ.

NOTES

Thus, the filing sequence of catalogue entries in a classified catalogue and arranging books on the shelves is not self-evident and easy in the case of class numbers derived by using CC-7. However, the average length of notation is less because of its wide base. The notation is faceted and uses fraction principle for both numbers and letters. The notation has enabled CC to claim a status of a freely faceted scheme for classification. CC being a scheme using mixed notation is in a better position to meet the onslaught of the universe of subjects. CC is in a better position with regard to its hospitality to include new topics in its arrays and chains. Due to the availability of indicator digits, CC-7 is able to provide for three levels of phase relations. Within each level, six lands of phase relations are provided. Because of its mixed notation CC has a greater capability of achieving mnemonic structure in its class numbers. CC-7 achieves hospitality both an array and chain hospitality in array **1** e the quality of notation which permits extrapolation and interpolation in an array, is achieved through the use of sector device, subject device, alphabetical device, chronological device, geographical device, emptying digits and so forth. Hospitality in chain **1** e the quality of notation which permits arrangement of classes in successive subordination, is achieved through decimal fraction principle, facet device, use of sectors or zones, phase relations and others. The mnemonic value of the notation in CC-7 is very great, as the scheme is highly systematic. It uses four lands of mnemonics scheduled, systematic, seminal and alphabetical. However, the notational system is very much complicated for average librarians. This is the only effective system to withstand the onslaught of the universe of subjects.

2. Knowledge Organization in Dewey Decimal Classification (DDC)

Decimal Classification of Melvil Dewey was published in 1876. It was an advancement on the previous two systems. Firstly, a notation of great simplicity and flexibility mechanized the systematic order. The principle of relative location of books on shelves became feasible, which replaced the principle of fixed location. Secondly, the relative index, which showed the relative aspects of a subject, scattered in the schedule. Dewey Decimal Classification (DDC) was first formulated in 1873 and applied at the Amherst College library. The scheme was published in 1876 entitled "A Classification and Subject Index, for cataloguing and arranging the books and pamphlets of a library." The scheme has passed through different editions after revisions and modifications. The latest is 21st edition. This edition has been edited by Joan S Mitchell and others and published by Forest Press, New York, in 1996.

Structure of DDC, Edition 21: DDC-21 is in four physical volumes and contains 4,126 pages divided as under:

Volume 1 Introduction - Tables - lxix + 625 pages

Volume 2 Schedules - 000-599 - xx + 1200 pages

Volume 3 Schedules - 600-999 - vu + 1005 pages

Volume 4 Relative Index - Manual - vn + 1207 pages

NOTES

The **Volume 1** contains publisher's forward, preface by the Decimal Classification Editorial Policy Committee. New features in Edition 21, Introduction to the Dewey Decimal Classification, Glossary, Index to the introduction and glossary, publishing history of the DDC, Tables, Relocations and Reduction, Comparative tables, Equivalence tables, Reused numbers and others.

The **Volume 2** of DDC-21 covers the subject schedules from 000-599. Preceding the schedules the first three summaries of the total schedules are given. These summaries help to visualize at a glance the structure and scope of various subjects as laid out in the DDC.

The **Volume 3** covers subject schedules 600-999. The schedules in these two volumes are in fact, a full expansion of the ten Main classes in hierarchical order. Each entry contains a class number on the left and on its right is given the caption or content of the number. Under many of the class numbers, there are a variety of notes.

The **Volume 4** contains the Relative index and Manual. The Relative index brings together all aspects of a single topic, which have been scattered by discipline in the schedules. The schedules and the index are complementary to one another. The Manual helps practicing classifiers in classifying difficult subjects and explains how to choose between related numbers. It is arranged in the numerical sequence of the tables and schedules.

Basic Plan: DDC is a hierarchical scheme of classification, which proceeds from the general to the specific. The basic arrangement is by discipline and a specific subject can occur in any number of disciplines. This is due to the fact that each aspect of specific subject would go into a different discipline. And it is the relative index, which brings together different aspects of a specified subject.

In DDC, the universe of subjects has been divided into ten Main classes as under;

000 Generalities

100 Philosophy and Psychology

200 Religion

300 Social Sciences

400 Language

500 Natural Sciences and Mathematics

600 Technology

700 The Arts

800 Literature and rhetoric

900 Geography and History

The above order of Main classes is based on the inverted Baconian order. These ten Main classes belong to the first summary. Each of the above Main

classes indicates that each Main class represents either a broad discipline or a group of related disciplines. However, class 000, Generalities include varied subjects such as bibliographies and catalogues, library and information sciences, general encyclopaedias, general serial publications and so on. Each Main class has 10 divisions. The divisions are the second degree of subdivision in the classification, represented by the second digit in the classification. This constitutes the second summary. There are 100 such divisions. Division 0 is allocated for general works on the entire Main class, and 1 to 9 digits are used for subclass of the Main class. The 10 divisions of 300 Social Sciences are as follows:

300 Social Sciences

310 General Statistics

320 Political Science

330 Economics

340 Law

350 Public administration and military science

360 Social problems and services, associations

370 Education

380 Commerce, Communications, Transportation

390 Customs, Etiquette, Folklore

Here the division 0 is not allocated for general works as in other Main classes. In all other Main classes, the first ten divisions, i.e., 201-209 or 701-709 are devoted to general works applicable to the specific Main classes; for example, 205 means serial publications of Christianity, 705 means serial publications of FME and Decorative Arts. But 305 do not mean serial publications of Social Sciences. It denotes Social Groups (Sociology). Each division of the second summary again has ten sections. These are the three degree of subdivisions in the classification and belong to the third summary. These are nearly 1000 in number. Again within the sections, the first one is allocated for general works on the entire division and the rest are used for sub-subclasses; for example, the ten sections of the division 330 are as follows:

330 Economics

331 Labor Economics

332 Financial Economics

333 Economics of land and energy

334 Cooperatives

335 Socialism and related systems

336 Public finance

337 International Economics

338 Production

339 Macro- Economics and related topics

Thus, the scheme uses pure decimal numbers to represent various subjects. The basic character of DDC is enumerative.

NOTES

Auxiliary Tables: DDC-21 has seven auxiliary tables, which are common to the schedules, provided in volume 1. They are meant for extension and synthesis of classes to meet the ever-growing needs of libraries. The auxiliary tables are as follows:

Table 1 Standard Subdivisions

Table 2 Geographic areas, historical periods, Persons

Table 3 Subdivisions for individual literatures for specific literary forms

Table 3A Subdivisions for works by or about individual author

Table 3B Subdivisions for works by or about more than one author

Table 3C Notations to be added where instructed m Table 3-B and in 700 4, 791 4 and 808-809

Table 4 Subdivisions of individual languages

Table 5 Racial, Ethnic, National groups

Table 6 Languages

Table 7 Groups of Persons

Notation: The notation in DDC consists of Indo-Arabic numerals used decimally. DDC follows hierarchical system of notation. It is based on 10 Main classes, 100 divisions and 1000 sections. The numbers are lengthened by one digit at the stage of successive division. The hierarchy is followed in disciplinary, as well as in subject relationships. DDC is a decimal classification system. At each stage of division, a given number is subdivided decimally. As far as notation is concerned, the central principle followed is that of maximum flexibility and simplicity, obtained by pure decimal numbers. The use of consistent order in the subject division of different classes is also an important principle followed. In short, DDC gained worldwide popularity because of its cardinal virtues namely, universality and hospitality for new subjects, a simple and expandable notation, good mnemonic features, a permanent machinery for its revision and updating, availability in full and abridged editions and last but not the least an outstanding relative index.

2.3.2 Scope of Knowledge

Let us now study about the scope of knowledge.

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, emphasizes the importance of the organization of public knowledge. There are three aspects to the organization of public knowledge viz. a) organization by creating, b) self-organization and c) bibliographic organization. Organization 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-organization 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 organization of knowledge that can cut across the conventional classificatory norms known to librarians.

Bibliographic organization refers to the organization 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.

2. Tacit and Explicit Knowledge

The above two groups of knowledge are 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, and 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 formalize, 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 organizational strength of a company to be competitive in a market.

NOTES

2.3.3 Three Worlds of Knowledge

Another view of knowledge is the way Karl Popper has identified knowledge groups, more on a philosophical plane. Popper's ontological scheme is to see three worlds of knowledge. namely, 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 the mind and intellect and other sense faculties, humans observe everything in their environment and make their own subjective understandings. World 3 is one in 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 centres.

Personal knowledge is short lived. Human history has seen great persons, achieving extraordinary successes in so many walks of life. Such outstanding persons with great calibre have left their prints in history. 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 is not possible to be recorded.

2.4 DEVELOPMENT AND MODES OF FORMATION OF SUBJECTS

The organization of public knowledge in their physical forms of print and non-print materials, in libraries and information centres, 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 organizing collections with the same pace of the growth of knowledge. Libraries and information centres 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 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 kept updated with the expanding horizons of knowledge. The designing of these tools and their developments needs 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 and so forth; not only to take care of past and present knowledge but also for the future developments. He provided a general framework for organizing 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.

2.4.1 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 isolate idea on the basis of two or more quasi isolate ideas."

Example: Sociology of Rural Poor.

Neelameghan's Extension

NOTES

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 the following:

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 and breaking up 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 organization 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 programmes. 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 specialization 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, and Studies centered around famous personalities – Gandhi; studies grouped together as in Defence Sciences.

Others: Environmental Sciences, Ocean Sciences and so forth

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.

NOTES

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 organization of information knowledge and information for various other purposes, collection development, information storage and retrieval and others. Research studies on the 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.

2.4.2 Knowledge Utilization

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 industrialization and further ahead to the post-industrial state, it tends to utilize science, technology and societal knowledge in an increasing measure, in all developmental activities. Hence, it progressively becomes an information/knowledge society. This society is characterized by the increasing use and utilization 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 utilization 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, its 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

NOTES

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 in 1958. This policy has laid the foundation 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 organizations to bridge research and industry, multimedia centres and many others are undoubtedly meant to create the necessary conducive environment for knowledge creation, use and utilization. India, very soon is going to become a superpower in software technology.

Check Your Progress

1. What does the term 'knowledge organization systems' denote?
2. What is organization of knowledge?
3. Who devised the system of Colon Classification?

2.5 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. The term *knowledge organization systems* is intended to encompass all types of schemes for organizing information and promoting knowledge management. Knowledge organization systems include classification schemes that organize materials at a general level (such as books on a shelf), subject headings that provide more detailed access, and authority files that control variant versions of key information (such as geographic names and personal names).
2. Organization of knowledge is an interdisciplinary cultural activity, which adds informational value to collections containing knowledge. It assigns subject access points to items such that the needs of the user groups of the associated information system are served best.
3. The system of Colon Classification was devised by Dr S R Ranganathan.

2.6 SUMMARY

NOTES

- Knowledge is the sum of known and unknown entities and is the result of human endeavours and past experiences accumulated through generations. It is passed on from generation to generation and from civilization to civilization.
- The process of knowledge discovery and creation in science has traditionally followed the path of systematic exploration, observation, description, analysis, and synthesis and testing of phenomena and facts.
- 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.
- The term *knowledge organization systems* is intended to encompass all types of schemes for organizing information and promoting knowledge management.
- Random House Dictionary (RHD) of the English Language, defines knowledge as (a) acquaintance with facts, truths or principles, as from study or investigations (b) as familiarity with a particular subject, branch of learning and so forth".
- When we talk of knowledge, we recognize that it comprises number of subjects, each having its own parameters and scope for independent study.
- Knowledge is the totality of what is known and is the creation of human mind. Knowledge has various characteristics. The characteristics of universe of knowledge are that it is infinite, continuum, turbulently dynamic, multidimensional and coherent.
- Organization signifies the organic structure of work in which all the elements are organized in such a manner as to make sense. The grouping of things in laboratories, book shops or in libraries is a necessity so that object can be used easily, smoothly and quickly.
- The purpose of library classification is to arrange the subjects in a linear sequence helpful to the majority of readers and to mechanize the arrangement by providing each subject a unique number.
- The universe of knowledge is broadly divided at the first instance into Natural Sciences, Humanities and Social Sciences.
- Decimal Classification of Melvil Dewey was published in 1876. It was an advancement on the previous two systems. Firstly, a notation of great simplicity and flexibility mechanized the systematic order.

NOTES

- The above order of Main classes is based on the inverted Baconian order. These ten Main classes belong to the first summary. Each of the above Main classes indicates that each Main class represents either a broad discipline or a group of related disciplines.
- 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.
- 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.
- The organization of public knowledge in their physical forms of print and non-print materials, in libraries and information centres, has to continuously grapple with the rapidly expanding dimensions of knowledge.
- Any discussion of knowledge use and utilization would be incomplete if we do not take account of the unprecedented impact of Information and Communication Technology (ICT).

2.7 KEY WORDS

- **Citation:** It is a reference to a published or unpublished work.
- **Knowledge:** It refers to understanding a particular topic either through experience or study.

2.8 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions

1. Write a short note on knowledge classification.
2. Briefly mention the nature and characteristics of knowledge.
3. What is personal knowledge? How is it different from public knowledge?

Long Answer Questions

1. Discuss knowledge organization in CCC and DDC.
2. Different between tacit knowlege and explicit knowledge.
3. Explain Dr Ranganathan's modes of formation of knowledge.
4. Analyse the impact of Information and Communication Technology in the present scenario.

2.9 FURTHER READINGS

Parkhi, RS. 1960. *Library Classification: Evolution and Dynamic Theory*. Bombay: Asia Publishing House.

Raju A. 1991. *Universal Decimal Classification.* Madras: T.R. Publishers.

Ranganathan SR. 1963. *Colon Classification*. Sixth Edition. Bombay: Asia Publishing House.

Ranganathan, SR. 1965. *Prolegomena to Library Classification,* Second Edition. London: Library Association.

NOTES

UNIT 3 KNOWLEDGE ORGANIZATION

NOTES

Structure

3.0 INTRODUCTION

Knowledge Organization (KO), organization of knowledge, organization of information, or information organization is a branch of Library and Information Science (LIS) concerned with activities such as document description, indexing, and classification performed in libraries, databases, archives and so forth. It addresses the "activities carried out and tools used by people who work in places that accumulate information resources (e.g., books, maps, documents, datasets, images) for the use of humankind, both immediately and for posterity. It discusses the processes that are in place to make resources findable, whether someone is searching for a single known item or is browsing through hundreds of resources just hoping to discover something useful. Information organization supports a myriad of information-seeking scenarios." Traditional human-based approaches performed by librarians, archivists and subject specialists are increasingly challenged by computational (big data) algorithmic techniques. KO as a field of study is concerned with the nature and quality of such Knowledge Organizing Processes (KOP) (such as taxonomy and ontology) as well as the resulting Knowledge Organizing Systems (KOS).

In this unit, you will study about knowledge classification and document classification, physical arrangement of documents, notation, functions and arrays.

3.1 OBJECTIVES

NOTES

After going through this unit, you will be able to:

- Discuss the approaches with reference to organizing knowledge
- Explain knowledge classification
- Analyse document classification
- Describe physical arrangement of documents
- Examine notation, function and arrays

3.2 APPROACHES TOWARDS ORGANIZING KNOWLEDGE

Divergent historical and theoretical approaches towards organizing knowledge are based on different views of knowledge, cognition, language and social organization. This richness lends itself to many complementary ways to consider knowledge organization. The academic International Society for Knowledge Organization (ISKO) engages with these issues via the research journal *Knowledge Organization*.

1. Traditional approaches

Among the major figures in the history of KO are Melvil Dewey (1851–1931) and Henry Bliss (1870–1955).

Dewey's goal was an efficient way to manage library collections; not an optimal system to support users of libraries. His system was meant to be used in many libraries as a standardized way to manage collections. The first version of this system was created in 1876.

An important characteristic in Henry Bliss' (and many contemporary thinkers of KO) was that the sciences tend to reflect the order of Nature and that library classification should reflect the order of knowledge as uncovered by science:

Natural order → Scientific Classification → Library classification (KO)

The implication is that librarians, in order to classify books, should know about scientific developments. This should also be reflected in their education: "Again from the standpoint of the higher education of librarians, the teaching of systems of classification . . . would be perhaps better conducted by including courses in the systematic encyclopedia and methodology of all the sciences, that is to say, outlines which try to summarize the most recent results in the relation to one another in which they are now studied together. . . ." (Ernest Cushing Richardson, quoted from Bliss, 1935, p. 2).

NOTES

Among the other principles, which may be attributed to the traditional approach to KO are the following:

- Principle of controlled vocabulary
- Cutter's rule about specificity
- Hulme's principle of literary warrant (1911)
- Principle of organizing from the general to the specific

Today, after more than 100 years of research and development in LIS, the "traditional" approach still has a strong position in KO and in many ways its principles still dominate.

2. Facet analytic approaches

The date of the foundation of this approach may be chosen as the publication of Dr S R Ranganathan's Colon Classification in 1933. The approach has been further developed, in particular, by the British Classification Research Group. In many ways, this approach has dominated what might be termed "modern classification theory'.

The best way to explain this approach is probably to explain its analytico-synthetic methodology. The meaning of the term "analysis" is breaking down each subject into its basic concepts. The meaning of the term synthesis is combining the relevant units and concepts to describe the subject matter of the information package in hand.

Given subjects (as they appear in, for example, book titles) are first analysed into a few common categories, which are termed "facets". Ranganathan proposed his PMEST formula: Personality, Matter, Energy, Space and Time.

3. The Information Retrieval (IR) tradition

Important in the IR-tradition have been, among others, the Cranfield experiments, which were founded in the 1950s, and the TREC experiments (Text Retrieval Conferences) starting in 1992. It was the Cranfield experiments, which introduced the famous measures "recall" and "precision" as evaluation criteria for systems efficiency. The Cranfield experiments found that classification systems like UDC and facet-analytic systems were less efficient compared to free-text searches or low level indexing systems ("UNITERM"). The Cranfield I test found according to Ellis (1996, 3–6) the following results.

System	recall
UNITERM	82,0%
Alphabetical subject headings	81,5%
UDC	75,6%
Facet classification scheme	73,8%

NOTES

Although these results have been criticized and questioned, the IR-tradition became much more influential while library classification research lost influence. The dominant trend has been to regard only statistical averages. What has largely been neglected is to ask: Are there certain kinds of questions in relation to which other kinds of representation, for example, controlled vocabularies, may improve recall and precision?

4. User-oriented and cognitive views

The best way to define this approach is probably by method. Systems based upon user-oriented approaches must specify how the design of a system is made on the basis of empirical studies of users.

User studies demonstrated very early that users prefer verbal search systems as opposed to systems based on classification notations. This is one example of a principle derived from empirical studies of users. Adherents of classification notations may, of course, still have an argument. That notations are well-defined and that users may miss important information by not considering them.

Folksonomies is a recent kind of KO based on users' rather than on librarians' or subject specialists' indexing.

5. Bibliometric approaches

These approaches are primarily based on using bibliographical references to organize networks of papers, mainly by bibliographic coupling (introduced by Kessler 1963) or co-citation analysis (independently suggested by Marshakova 1973 and Small 1973). In recent years it has become a popular activity to construe bibliometric maps as structures of research fields.

Two considerations are important in considering bibliometric approaches to KO:

1. The level of indexing depth is partly determined by the number of terms assigned to each document. In citation indexing this corresponds to the number of references in a given paper. On the average, scientific papers contain 10–15 references, which provide quite a high level of depth.
2. The references, which function as access points, are provided by the highest subject-expertise: the experts writing in the leading journals. This expertise is much higher than that which library catalogues or bibliographical databases typically are able to draw on.

6. The domain analytic approach

Domain analysis is a sociological-epistemological standpoint. The indexing of a given document should reflect the needs of a given group of users or a given ideal purpose. In other words, any description or representation of a given document is more or less suited to the fulfillment of certain tasks. A description is never objective

NOTES

or neutral, and the goal is not to standardize descriptions or make one description once and for all for different target groups.

The development of the Danish library "KVINFO" may serve as an example that explains the domain-analytic point of view.

KVINFO was founded by the librarian and writer Nynne Koch and its history goes back to 1965. Nynne Koch was employed at the Royal Library in Copenhagen in a position without influence on book selection. She was interested in women's' studies and began personally to collect printed catalogue cards of books in the Royal Library, which were considered relevant for women's studies. She developed a classification system for this subject. Later she became the head of KVINFO and got a budget for buying books and journals, and still later, KVINFO became an independent library. The important theoretical point of view is that the Royal Library had an official systematic catalogue of a high standard. Normally, it is assumed that such a catalogue is able to identify relevant books for users whatever their theoretical orientation. This example demonstrates, however, that for a specific user group (feminist scholars), an alternative way of organizing catalogue cards was important. In other words, different points of view need different systems of organization.

DA is the only approach to KO which has seriously examined epistemological issues in the field, i.e., comparing the assumptions made in different approaches to KO and examining the questions regarding subjectivity and objectivity in KO. Subjectivity is not just about individual differences. Such differences are of minor interest because they cannot be used as guidelines for KO. What seems important are collective views shared by many users. A kind of subjectivity about many users is related to philosophical positions. In any field of knowledge different views are always at play. In arts, for example, different views of art are always present. Such views determine views on art works, writing on art works, how art works are organized in exhibitions and how writings on art are organized in libraries (see Ørom 2003). In general, it can be stated that different philosophical positions on any issue have implications for relevance criteria, information needs and for criteria of organizing knowledge.

3.3 KNOWLEDGE CLASSIFICATION AND BOOK CLASSIFICATION

Focusing on information extraction from semi-structured data, we have examined thousands of Web pages. We summarize the knowledge that is useful for guiding the information extraction as follows. We classify knowledge into three categories: general knowledge, domain specific knowledge and site specific knowledge.

- **General Knowledge:** General knowledge is true for most online documents, if not for all of them, that is, the knowledge is both domain independent and

site independent. Typical examples are the common usage of HTML tags, for example, what is a table, what is a paragraph, and what is a line.

- **Domain Specific Knowledge:** Domain specific knowledge is true in a particular domain. The knowledge is site independent, that is, the knowledge is consistent for most Websites if not for all of them as long as the Websites present data in the same domain. For example, in the real estate domain, each property in an online advertisement has a suburb where it is located; the price for renting a property is usually denoted by a "$", followed by a number, and a unit such as "per week" or "per month". Domain specific knowledge is usually specified using terms in a specific domain and may not generalize to other domains.
- **Site Specific Knowledge:** Site specific knowledge is true for a particular site. To prevent the intersection with domain knowledge, we define the site specific knowledge being domain independent, that is, if the knowledge is true for this site and also true for this domain, then it is classified into domain knowledge. Site specific knowledge mainly consists of the site specific data formatting conventions, for example, in a particular Website called NewsClassifieds, suburb names are printed in all capital letters. Site specific knowledge is tailored to a specific site and unlikely to be consistent with other sites.

This knowledge classification enables knowledge reuse and sharing, and also gives guidance for agent adaptation. General knowledge is completely reusable and can be shared for many information extraction tasks. Domain knowledge can be reused and shared for Websites in the same domain. Site specific knowledge is limited to Web pages on the same site. To adapt an agent to a new domain, new domain specific knowledge is needed. To adapt an agent to a new site, new site specific knowledge needs to be added.

3.3.1 Difference between Knowledge Classification and Book Classification

Let us now study the difference between knowledge classification and book classification.

Knowledge Classification: A classification used for any branch of knowledge, but which cannot be adapted for classifying books until a generalia class, form classes and divisions, a notation, and an index have been added.

Book Classification: A general term covering bibliographical classification mostly refers to library classification for arrangements of books and documents on the shelves.

Differences between knowledge classification and book classifications have been listed here.

Table 3.1 *Difference between Knowledge Classification and Book Classification*

NOTES

Knowledge Classification	Book Classification
It arranges knowledge on the basis of evaluating and classified thoughts, ideas and concepts for universal purpose.	It arranges expression of the knowledge.
It represents adequately the field of human learning.	Expression preserved in written records, documents with specific purpose.
It is based on preconceived ideas, essentially superficial.	It provides adequate subject approach to the existing collection.
Knowledge classification id multidimensional.	It has to be one dimensional from left to right along the shelf.
Reality cannot be classified, only our knowledge of it exists as expressed thoughts.	It is a convenient device for location of known workers.
The terms which are un-linear, must be set down before classification can be made.	Book classification can be constructed by producing helpful arrangement and based on the 'order of nature".
It is mental planning of the thought (subject).	It is a transcribing of thoughts in subjects.
It consists of main branch of universe of knowledge.	It consists of terms of the knowledge.
It is human mental faculty.	It contains words and phrases used for human mental faculties.
It is homogeneous region of the universe of knowledge.	It is a first array of schemes and each term of array makes a great area of knowledge.
It is based on personal theories and a new doctrine might upset.	It is based on systems and new doctrines facilitate the way of book classification.

3.4 DOCUMENT CLASSIFICATION

Document classification or **document categorization** is a problem in library science, information science and computer science. The task is to assign a document to one or more classes or categories. This may be done "manually" (or "intellectually") or algorithmically. The intellectual classification of documents has mostly been the area of concern of library science, while the algorithmic classification of documents is mainly in information science and computer science. The problems are overlapping, however, and there is therefore interdisciplinary research on document classification.

The documents to be classified may be texts, images, music and so forth. Each kind of document possesses its special classification problems. When not otherwise specified, text classification is implied.

Documents may be classified according to their subjects or according to other attributes (such as document type, author, printing year etc.). There are two main philosophies of subject classification of documents: the content-based approach and the request-based approach.

"Content-based" versus "request-based" classification

Content-based classification: In this classification the weight given to particular subjects in a document determines the class to which the document is assigned. It is, for example, a common rule for classification in libraries that at least 20 per cent of the content of a book should be about the class to which the book is assigned. In automatic classification, it could be the number of times given words appears in a document.

Request-oriented classification (or -indexing) is classification in which the anticipated request from users is influencing how documents are being classified. The classifier asks himself: "Under which descriptors should this entity be found?" and "think of all the possible queries and decide for which ones the entity at hand is relevant" (Soergel, 1985).

Request-oriented classification may be classification that is targeted towards a particular audience or user group. For example, a library or a database for feminist studies may classify/index documents differently when compared to a historical library. It is probably better, however, to understand request-oriented classification as *policy-based classification*. The classification is done according to some ideals and reflects the purpose of the library or database doing the classification. In this way, it is not necessarily a kind of classification or indexing based on user studies. Only if empirical data about use or users is applied should request-oriented classification be regarded as a user-based approach.

Classification versus indexing

Sometimes a distinction is made between assigning documents to classes ("classification") versus assigning subjects to documents ("subject indexing") but as Frederick Wilfrid Lancaster has argued, this distinction is not fruitful. The view that this distinction is purely superficial is also supported by the fact that a classification system may be transformed into a thesaurus and vice versa (cf., Aitchison, 1986, 2004; Broughton, 2008; Riesthuis & Bliedung, 1991). Therefore, is the act of labelling a document (say by assigning a term from a controlled vocabulary to a document) at the same time to assign that document to the class of documents indexed by that term (all documents indexed or classified as X belong to the same class of documents).

NOTES

Automatic document classification (ADC)

Automatic document classification tasks can be divided into three sorts: **supervised document classification** where some external mechanism (such as human feedback) provides information on the correct classification for documents, **unsupervised document classification** (also known as document clustering), where the classification must be done entirely without reference to external information, and **semi-supervised document classification**, where parts of the documents are labelled by the external mechanism. There are several software products under various license models available.

3.4.1 Techniques

Automatic document classification techniques include the following:

- Expectation maximization (EM)
- Naive Bayes classifier
- tf–idf
- Instantaneously trained neural networks
- Latent semantic indexing
- Support vector machines (SVM)
- Artificial neural network
- K-nearest neighbour algorithms
- Decision trees such as ID3 or C4.5
- Concept Mining
- Rough set-based classifier
- Soft set-based classifier
- Multiple-instance learning
- Natural language processing approaches for modelling RBP

3.4.2 Applications

Classification techniques have been applied to

- spam filtering, a process which tries to discern e-mail spam messages from legitimate emails
- email routing, sending an email sent to a general address to a specific address or mailbox depending on topic
- language identification, automatically determining the language of a text
- genre classification, automatically determining the genre of a text
- readability assessment, automatically determining the degree of readability of a text, either to find suitable materials for different age groups or reader types or as part of a larger text simplification system

NOTES

- sentiment analysis, determining the attitude of a speaker or a writer with respect to some topic or the overall contextual polarity of a document.
- health-related classification using social media in public health surveillance
- article triage, selecting articles that are relevant for manual literature curation, for example as is being done as the first step to generate manually curated annotation databases in biology.

3.5 PHYSICAL ARRANGEMENT OF DOCUMENTS

We find in libraries various types of documents such as manuscripts, printed books, periodicals, pamphlets, reports, photo reproductions, sound records, films, musical scores, microfilms, maps, atlases, charts, illustrations and electronic media items, such as CD-ROMs, through which human thought is communicated and preserved. Proper collection, storage and maximum use of these documents is the prime concern of present day libraries.

Nature of Documents

The problem of collection, storage and retrieval of documents has been complicated by the following factors:

- The steady growth in the output of various types of documents popularly known as the "knowledge explosion" or "information explosion" or "information flood" or "information boom or bloom".
- The publication of documents in various languages of the world. The production of documents in diverse physical forms.
- The nature and complexity of the thought content of the subject matter presented in various forms of documents.
- The complexity of readers approach to documents and libraries.

Each document, like an individual, is not only unique but also exhibits relations of considerable complexity with other documents. Extrinsic features like size, colour, volume, binding, year of publication and intrinsic features like thought content and their arrangement inside the document, or the nature of information, i.e., textual, numeric, bibliographic or graphic, also add to the complexity of the problem of libraries for achieving the objective of maximum utilization of their collections.

The complexity of thought content and the nature of relationships between various types of documents must be known and clearly established for their maximum use. The maximum use of documents can be ensured by:

(i) personal assistance to readers,

(ii) systematic arrangement, and

(iii) proper display of materials in the library.

NOTES

If the collection of a library is arranged in a systematic way documents can be located and retrieved easily. A classification scheme is the map or device for the arrangement of books in the library.

Collection and Storage of Documents

From the dawn of civilization man has recognized the need for collecting and preserving the records of human thought. Books and other graphic material are the records of human thoughts, action and achievement and can serve as the basis for future achievement. Their value to society, thus, cannot be exaggerated. These records are collected and preserved in libraries for the benefit of present and future generations. These records, diverse in form and content, are referred to by the generic term documents.

3.5.1 Factors Determining Arrangement of Documents

Documents can be arranged in various ways in a library, for example, by author, or by title, or by, 22 Elements of Library Classification subject or by basis such as size, language, colour of binding or any other such criterion. The needs of the readers may be the criterion one can consider for arrangement of documents in a library. Mills, in his book *Modern Outline of Library Classification*, lists the following possible characteristics determining the arrangements of documents:

(i) **Age of reader:** Children's books are distinguished from adult books.

(ii) Conditions attached to the use of the material: Books for lending are distinguished from those to be consulted within the library. Generally "Reference Books" come under this category.

(iii) **Documents of unusual size:** Documents of an abnormal size, oversize or undersize, are shelved separately. This is done to conserve space in the stack area.

(iv) **Documents of unusual gross body:** Micro cards, gramophone records, tapes, slides and other audio-visual material and electronic documents are shelved separately.

(v) **Thought content of the document (subject matter):** Factual literature is arranged by subject, imaginative literature by language or author.

(vi) **Language of the document:** Documents in foreign languages are separately arranged in their original languages.

(vii) **Value of the document:** Manuscripts and rare and costly documents are shelved separately.

(viii) **Peculiarities of form of presentation:** Files of bound periodicals are separately shelved.

(ix) **Date of printing:** Incunabula - early printed books - are shelved separately.

(x) **Local history collection:** Documents dealing with various aspects of a place, locality or region are shelved separately.

(xi) **Gift collection:** A large number of books may be gifted with the condition to shelve them separately.

The above factors influence the arrangement of documents in libraries. But thought content or subject arrangement (fifth in Mill's list) is still the dominant and important factor for deciding the sequence of documents. All other factors in the above list are functional. Though a collection can be divided into several sections on the basis of any of the above functional factors, it would still be helpful to arrange documents in each section on the basis of subject matter. This leads to parallel sequences in the various collections in libraries. In any library, the total collection gets divided into some separate collections of general books and reference books, textbooks, journals and others. There are, thus, many sequences of books on one and the same subject in the library. These sequences are known as "parallel sequences".

NOTES

3.5.2 Arrangement of Documents in Libraries

Until the end of the 19th century library collections were small in size. Not as many subject fields had developed as one notices now, and publishing was not as widespread. The readership was not as large as we notice in the present times. Libraries of yesteryear attempted to arrange their collections on the basis of fixed locations. This method was employed to allocate each and every document at a particular and permanent place on a particular shelf of the library. Each new document, irrespective of its thought content, was assigned to the place immediately next to the one previously added to the collection. The fixed location failed to bring together documents embodying the same subject. Fixed location implied chronological order of accession under broad subject categories. In some of the older libraries, attempts were made to arrange the collection on the basis of extrinsic characteristics such as colour, size, year of publication and type of binding of documents. All these arrangements or sequences are not as helpful as the subject arrangement.

Shelving and Shelf-Reading Procedures

Shelving

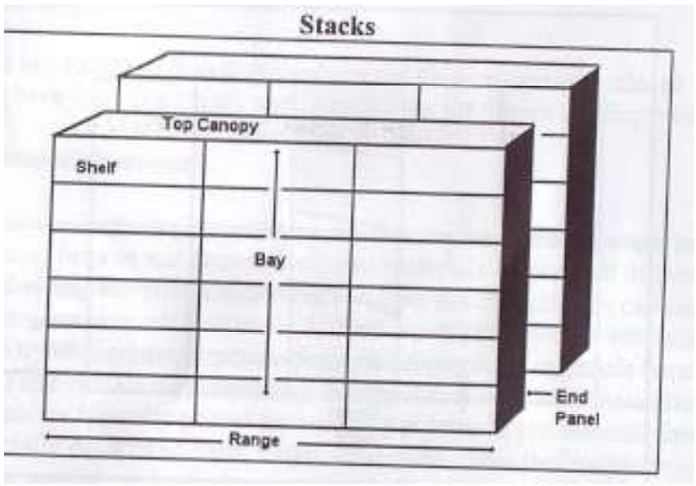
In a busy library, shelving and shelf work is a never-ending and seemingly thankless task. The arrangement of books in the library makes them accessible and usable by library patrons. If materials are misplaced or never reshelved, locating information would be impossible. It is recommended that all library materials be reshelved within twenty-four hours of their return to the library, yet many libraries fail to realize the importance of shelf work. Although shelvers may rarely come into contact with library patrons and are often the most junior people in the staff, the quality, speed, and efficiency with which shelving is carried out will affect how patrons view the library and its services. Backlog of unshelved material causes delay in service because patrons must wait for unshelved items to be located. Shelving and shelf work is critical for the efficiency and effectiveness of any library.

NOTES

Terminology of bookshelves

Before discussing shelving arrangements, it is important to be clear about the terminology used to describe shelves and shelving in libraries. There are four components to bookshelves. Let us now study about them.

1. **Shelf:** It refers to a flat piece of wood or metal that is placed horizontally between two uprights to hold books. Shelves are hung in a series of slots running the length of each side of the upright. This permits shelves to be easily adjusted for materials of varying heights. A 3ft. shelf length is the standard. Depths of 8, 9, 10, and 12 inches are available. However, a 9 inch depth is considered the standard.



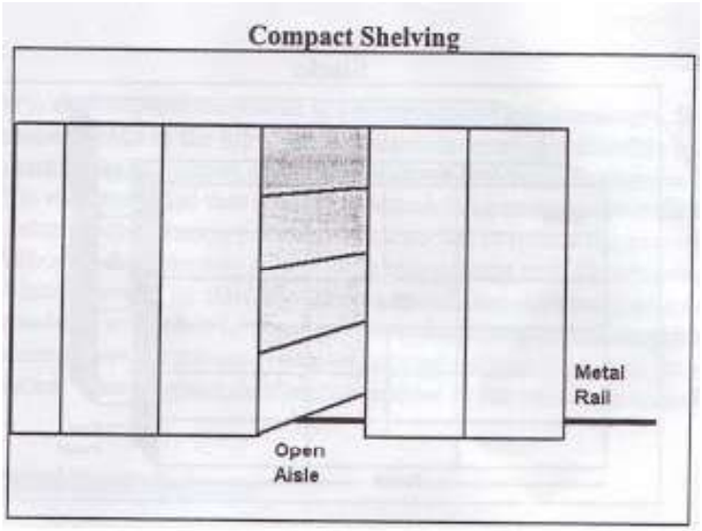
2. **Section (also called a Bay)**: A vertical series of shelves, between two uprights. A section is 3 ½, 5 ½, or 7 ½ feet high. The section is the basic unit of shelving and may be
   (a) **Double-faced**: Shelves are hung on both sides
   (b) **Single-faced**: Shelves are hung on one side only and are usually placed against a wall
3. **Range**: It alludes to a number of sections lined up end to end. Ranges are aligned parallel to each other. Sections of freestanding shelves are usually bolted together and made more aesthetically pleasing by installing end panels. As well a range will be capped with a top, referred to as a canopy top. The canopy top adds stability, protects books on the top shelf from getting dusty, and gives a finished appearance to the range.
4. **Stacks**: All the ranges within the library are collectively referred to as "the stacks". The aisle width between ranges should be a minimum of 3 feet. Information about access to people with disabilities is available from the National Library of Canada.

Different types of shelving

In addition to the standard shelving illustrated above, there are a large variety of display and special purpose shelving available for:

- Audio-visual materials
- Periodicals and paperbacks
- Special displays (for example, new books)

As well, special types of storage shelving has been developed to help libraries rearrange their collections to increase capacity. Compact storage systems can house more books than traditional shelving in the same amount of floor space because most aisles are eliminated. There are two kinds of compact shelving:

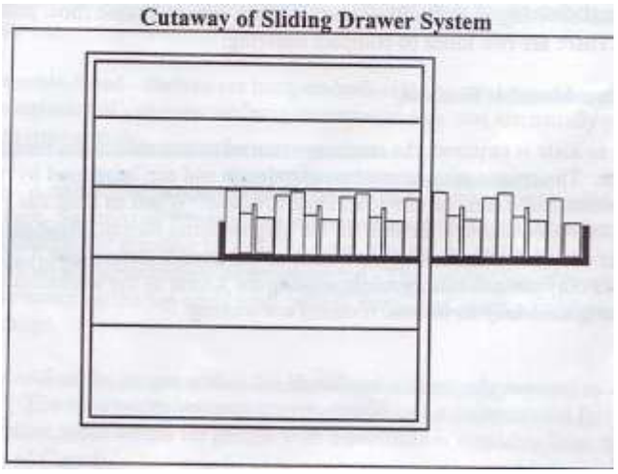


1. Compact mobile shelving

When an aisle is required, the stacks are moved to one side or the other to open-up an aisle. The ranges are mounted on metal rails and can be moved by pushing, use of a mechanical crank, or use of an electric motor. When an aisle has been opened, there is no aisle access available for the neighbouring ranges. Built-in safety devices ensure that an aisle cannot close with a patron standing in it. Patrons and shelvers may have to line up while waiting for unavailable ranges. Browsing time may be limited if others are waiting. This type of shelving is usually used for infrequently used material or for items that can be retrieved without browsing (for example, outdated book collections or old runs of bound periodicals). Because of the weight of compact movable shelving is heavier than standard shelving, it must be installed on the ground floor or in a specially built facility.

NOTES

NOTES



2. Sliding drawer system

This type of shelving is a fixed framework of individual shelves and can be pulled out into the aisle. It requires more aisle room than standard or compact shelving.

Open and closed stacks

Library collections can be open stacks or closed stacks.

1. Open stack collection

Open stack collections give patrons complete access to the materials on the shelves. Patrons may browse and choose their own materials. The result of open access is more reshelving and maintenance to keep the collection in call number order. There are extra problems with security. Libraries try to discourage patrons from reshelving their materials because untrained individuals may misshelve materials and as a result materials get lost. Signs are typically posted encouraging patrons to put material they have used onto specially designated carts, tables, or shelves. This facilitates the job of collecting, sorting and reshelving materials for library staff. The level of maintenance required in an open stacks collection is justified by a major increase in accessibility for the patron.

2. Closed stack collection

Any collection that is not open to the general public or only on a selective basis is a closed stack collection. Stacks are usually closed to protect rare or valuable material or control high-demand materials. In libraries with closed stacks, materials are "paged", i.e., the item is retrieved by a library staff member and brought to the patron. The patron requests the material by writing the call number on a "call slip" that is given to a staff member at the circulation desk. The library staff member, or page, is sent to select the requested book from the closed stacks and carries it or sends it by conveyor or booklift to the circulation desk where it is given to the user.

NOTES

Closed stack collections are prevalent in universities, special libraries and archival collections. Since the collection is accessible only to library staff, it is generally in better call number order and requires less maintenance. Also, the stacks can have narrower aisles than open stacks, so the collection may require less floor space.

Libraries with open stacks may keep certain materials in closed stacks because they are in high demand, valuable, or may be stolen. Some materials are kept in closed separate stacks because of their physical shape (for example, maps or newspapers). As well, if a collection is very large and the library has fixed stack space, little used materials are often kept in a closed stack storage area.

(i) Shelving arrangements

The arrangement of books on the shelves make them accessible to patrons and library staff. Unless you are starting or completely revising a library collection, the arrangement of materials in the stacks is already established.

In all types of libraries, non-fiction is usually arranged according to classification systems (Dewey Decimal or Library of Congress). These systems group material by subject and make it possible to browse the shelves.

In public libraries, fiction is arranged in one of the three ways:

(i) Alphabetical order according to the author's last name

(ii) By type or genre (for example, science fiction, mystery, romance)

(iii) By audience (for example, children, young adult, adult)

- Academic libraries classify fiction as "literature". Literature is arranged by call number (usually Library of Congress) so that an author's works are shelved in the same area with the criticism of these works.

Most libraries have reference material shelved in a separate area from the regular collection. Reference materials will include such things as dictionaries, atlases and handbooks that are consulted on a regular basis.

Other materials that are often kept in separate areas include the following:

Audio-visual materials

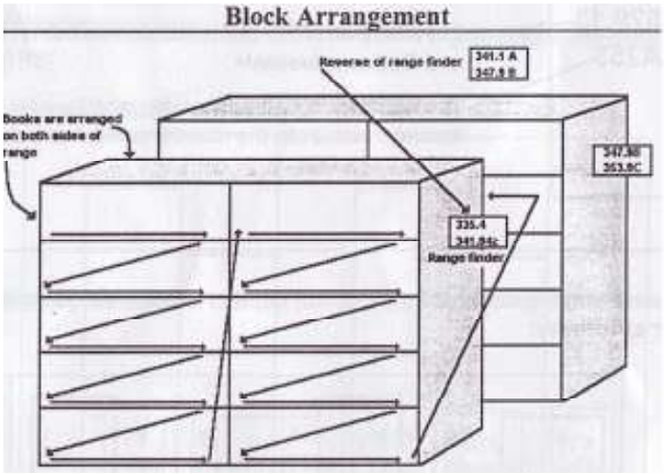
- o Biographies
- o Foreign language materials
- o Government publications
- o Large print books
- o Micro formats for example, microfilm or fiche
- o New books
- o Newspapers
- o Paperback fiction

- o Periodicals
- o Rare books

NOTES

Shelving these types of materials in separate areas facilitates browsing. As well, the nature of the material may require special cases or shelving. However, separate areas makes shelving, retrieval, and browsing more complicated. Signage and library maps are helpful tools for explaining library arrangements.

Materials are arranged in the stacks using a block arrangement. The typical pattern of shelving is from left to right, from the top shelf down, section by section and range by range.



Call numbers and shelving

Library materials are assigned to their places on the shelves through the use of call numbers. These are found on the spine label. Call numbers arrange materials by subject based on classification systems. In addition, the call number divides subject classification by author. In North American libraries, the two most common systems are Library of Congress and Dewey Decimal.

Dewey Decimal Classification

In public and school libraries, non-fiction books are usually shelved according to the Dewey Decimal Classification (DDC) system. These call numbers consist of whole numbers and decimals (for example, 629.13, 629.5. 629.9). Typically, a DDC is not sufficient to identify a work for all library purposes. A book number, also called an author number or Cutter, is added to the classification number to create a unique call number for each item in the library. The call number is composed of a classification number and an author number (for example, 629.13 A253).

The book number is used to create a unique call number. The simplest form, used by small school and public libraries, is one to three letters from the author's last name. Instead of an author number, many libraries use Cutter numbers,

named after their inventor Charles Ammi Cutter. The author number is derived by combining the initial letter or letter(s) of the author's last name with numbers from a numerical table designed to ensure an alphabetical arrangement of names. The Cutter number is a decimal.

NOTES

Components of DDC call number with a cutter number

Example:

629.13

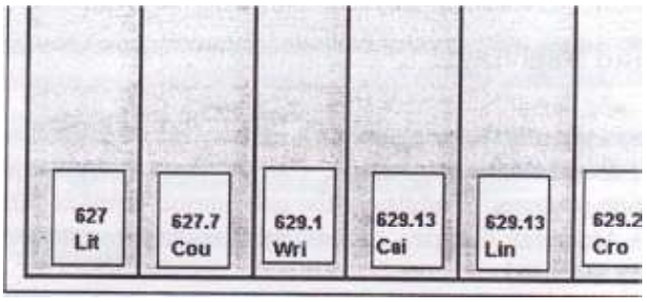
A253

629 = The first part of the classification number is a whole number and is filed numerically.

.13 = The next part of the classification number is read and filed as a decimal

A253 = The third line is filed by the letter and then by the number. However, the number is read as a decimal.

A sample shelving arrangement for a DDC call number using a simple author would appear as follows:



For example, four books with the following call numbers:

641.5 Con

641.564 Cot

641.145 Cor

641.49 Con

Would have a correct sequence of:

641.145 Cor

641.49 Con

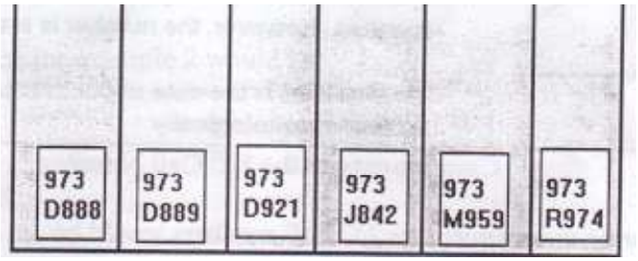
641.5 Con

641.564 Cot

Remember the latter part of the classification number is a decimal. Number "49" comes after "5", yet ".49" is smaller than "5". Similarly, ".5" is smaller than ".564".

NOTES

A sample shelving arrangement for a DDC call number using a Cutter number would appear as follows:



Four books have DDC call numbers with Cutter numbers as follows:

697.042 D30

697.001 D565

697 D345

697.042 D34

The correct sequence would be:

697 D345

697.001 D565

697.042 D30

697.042 D34

In school and public libraries, fiction books are often simply shelved alphabetically by the author's last name or simply by the author number or the cutter number. The classification number is usually used only with non-fiction.

Library of Congress

Most academic and special libraries shelve books according to the Library of Congress (LC) classification system. These call numbers are based upon groups of letters and numbers. The letter number combinations represent subjects.

Components of the LC call number

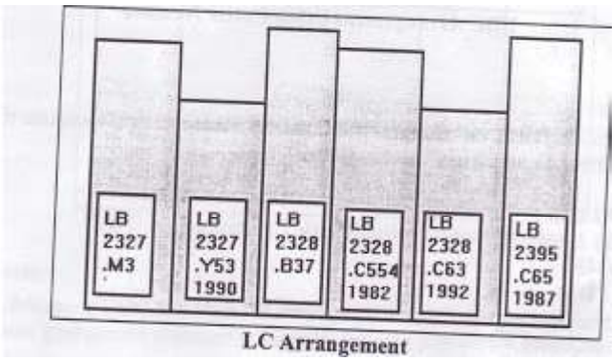
LB: The first unit consists of letters and is shelved alphabetically.

2395: The next unit consists of whole numbers and is shelved numerically.

.C65: The third line is shelved by the letter and then by the number. However, the number is read as a decimal

1991: The final line is the date of publication and should be filed chronologically.

A sample shelving arrangement for LC Call numbers would be the following:



LC Arrangement

NOTES

One example of LC call numbers with Cutter numbers is as follows:

HD 8103 .C65 1980

Z 682 .W65 1985

LB 2334 .I884 1983

TX 911.5 .T73 1979

A second example:

HD 30.3 .J36 1981

HD 57.7 .H46 1985

HD 31 .B48 1987

HD 216 .F75 1969

The correct sequence for example 1 would be as follows:

HD 810. .C65 1980

LB 2334 .I884 1983

TX 911.5 T73 1979

Z 682 .W65 1985

The correct sequence for example 2 would be as follows:

HD 30.3 .J36 1981

HD 31 .B48 1987

HD 57.7 .H46 1985

HD 216 .F75 1969

Special designators

In both the LLC and DDC systems, other special collections of items are arranged to the general rules that apply to the rest of the collection. However, special designators are added above the call numbers to show that the items are shelved in a special collection. Some examples include the following:

Juv Juvenile Juv C244

Ref Reference Collection Ref Q 175 .E3

Oversz Oversize Collection Oversz Q 175 .E3

NOTES

Shelf Work

Shelf work is the physical maintenance of the stacks and involves sorting, shelving, shifting and shelf-reading.

1. Sorting

Materials to be shelved come from a number of sources:

- returned material
- new acquisitions
- books used by patrons in the library and left on tables or special shelves

Before materials can be shelved, they need to be broken down into workable units according to shelf location and call number. Sorting prepares materials for efficient and quick reshelving. Sorting is usually done on book trucks or on special shelves.

2. Shelving

Shelvers move book trucks of sorted library materials to the appropriate location to begin shelving. As the books are shelved, the shelvers should be looking for misshelved materials and routing them to the sorting area, or reshelving them properly. Shelves should be straightened by aligning all spines even with the edge of the shelf. This makes it easier for patrons to see titles and remove them from the shelves. At the same time, volumes should be shifted to the left side of the shelf. A book support (a wire fixture hanging from the shelf above) or bookend should be used to draw the books closely together to prevent lean.

Books should not be tightened too much with the book support or bookend. If books are too tightly packed, patrons will have difficulty removing books and may damage book spines. Also, if they attempt to reshelve a book they will push several books to the back of the shelf.

If books are too loosely packed, the patron will push some of the books to the back of the shelf. Eventually, they fall in behind the shelf and are not easily found. Loosely packed books may fall off the front of the shelf and hurt someone. Books will sustain damage if they are leaning at sharp angles.

3. Shifting

Shifting is the process of moving sections of books. A shift may be necessary due to the following reasons:

- a collection is being rearranged
- differential growth in the collection

- portions of the collection are being removed
- new shelving has been added
- a new facility has been built

To minimize disruptions to patrons, shifts should be scheduled during periods of low collection use (for example, over holidays or between semesters).

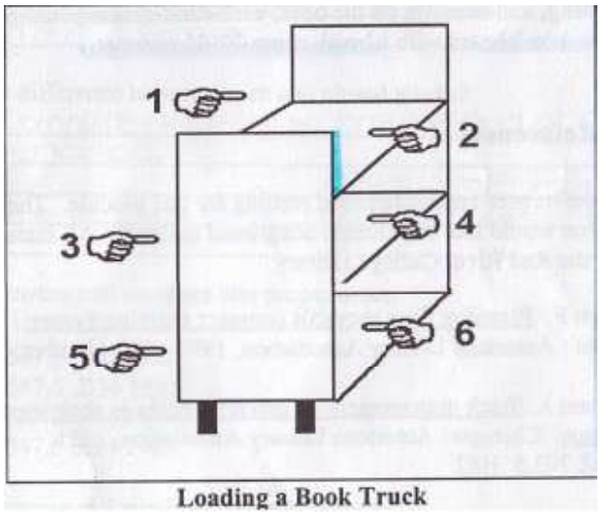
Free space can be obtained by:

* leaving top or bottom shelves empty
* leaving space at the end of each major break in classification
* leaving space at the end of each range

Each shelf should be left roughly two-thirds full. This gives enough room to shelve new books and returned books without overcrowding.

Remove books from the shelves by grasping them in the middle rather than tugging at the headcap. Adjacent books can be pushed slightly towards the back of the shelf so enough of the book can be exposed for grasping.

Book trucks are usually used for transporting materials. They should be loaded in the following manner to prevent non-sequential transfer to the new location and to keep the truck from tipping.



Loading a Book Truck

Load carts with the spines facing outwards, not up, to prevent spine damage.

Materials should be carefully placed in order in their new location. Range numbers and directional signs will need to be modified.

4. Shelf reading

Following a shift and on a regular schedule throughout the year, the collection should be shelf-read. Shelf-reading is the process of checking the shelves to make sure that each item is in its proper place. Books get out of order because of staff and patron errors. To keep the collection in order, each shelver is usually assigned

NOTES

a particular section of the stacks that they are responsible for reading on a regular basis (for example, daily, weekly, or monthly).

The library literature recommends shelf-reading at least once a week. In most libraries, there is simply not enough time, or staff, to shelf-read the entire collection once a week. Heavily used areas are shelf-read daily and other areas read less frequently.

As the shelves are read, any materials on crowded shelves should be shifted. Shelf-reading usually turns up lost or long overdue items that were incorrectly shelved. Shelf-reading is psychologically and physically challenging. Because it is boring, eye-straining, and stressful on the back, each shelf-reading session should be no more than 1 to 2 hours with a break every 30-45 minutes.

3.6 NOTATION, FUNCTIONS AND ARRAYS

Notation is a term which is used in classification schedule. Notation is a series of symbols, which is used to representing a subject, and it is a very important features of book classification in a library.

A book notation is a series of symbols which stands for the name of a class or any division or subdivision of a class, and forms a convenient means of reference to the arrangement of a classification.

The notation is an important addition to a classification scheduled; it has in no way determined its logic, its scope, or its sequence of development. It furnishes a convenient reference to the arrangement of a classification; the symbol is not assigned until after the schedule has been worked out. It has no more bearing on the preparation of the logic of a classification outline than the chapter numbers of a book have in fixing the themes of those chapters.

In most book classifications, the notation is a symbol that stands for either the subject of the book, or the style of writing. Since the notation is a sign translation of the classification, it usually ensures, when it is added to the backs of books, a book arrangement which represents the order of the schedules.

A notation then, is essential for the practical application of book classification; without notation it would be impossible to apply classification to books. As classification is the "foundation of librarianship", it can be said that "notation is the basis of practical book classification".

3.6.1 Types of Notation

A notation may consist of any symbols, letters, figures, or arbitrary signs to represent terms. There are two types of notation. These are:

1. Pure Notation
2. Mixed Notation

NOTES

1. Pure Notation: Pure notation consists of only one type of symbol; i.e., Arabic numeral (0,1,2…..9) and Roman letter (A-Z). It is found on the DDC (Dewey Decimal Classification), and EC scheme.

For example:

- 020 stands for Library & Information Science,
- 510 stands for Mathematics and so forth

2. Mixed Notation: Mixed notation consist of two or more type of notation. It is a mixture of letter and number, i.e., Arabic numeral and Roman letter (0-9) + (A-Z). it found in the UDC, LC, CC, BC & SC schemes.

For example:

- LCq- Science
- QC- Physic
- QC1- Periodicals

3.6.2 Functions

Let us now study the functions of notation in library classification.

1. Stands in place of terms used in the scheme of classification, so that whenever the term is to be represented it may be represented by a class mark only.

   For example:

   - The terms Mathematics, Chemistry, & Physics are referred to by the notation (In DDC) 510, 530and 540 respectively.

2. Shows the sequence of schedules and subordination of subjects. That means it not only stands in place of terms but also acts as a guide to locate their position in the schedules.

   For example:

   Let us take some terms used in DDC. The terms Mathematics, Astronomy and Physics do not convey any one of their places in the schedules, but anyone can easily understand when we say:

- 510- Mathematics
- 520- Astronomy
- 530- Physics

NOTES

3. Search to connect alphabetical order or index with the systematic order of schedules. That means consulting the number attach to the index entry, one can easily find out the place of subject in the classification schedules.
4. Search to connect the catalogue with the shelves. The symbols written on the spine of the book are also written on the cards of the individuals books, hence, by consulting the catalogue one can find out the exact location of a book or books on the shelves.
5. Maintenance systematic order on the shelves. The arrangement of books on the shelves should follow the systematic order shown on the classification scheme.
    - i.e., main class past, then division, sub-division and so on.
6. Notation assist in the efficient guiding of a library.
7. Its mnemonic qualities helps a librarian to remember the sequence of division within a class.
8. It helps to insert new topic in classification without changing the classification number.
9. It helps to divide a broader subject into various smaller division and then to arrange them in a convenient form.

3.6.3 Arrays and Chains

Isolates are arranged in what are described arrays and chains. An array is a sequence of coordinate (equally ranked) classes arranged in little definite order. Dr Ranganathan defines array as a set of classes arranged in the proper sequence and derived from a universe on the foundation of a single feature at any step in the progress towards a complete assortment of the entities of the universe. For instance, when arranged in few order, say through roll number, or alphabetically through name or in order of merit, form an array. Likewise, the sons and daughters of the similar parents are said to form an array. All the continents of the world form an array; and all countries of the world when arranged in order form an array. The army of classes, in its turn, can be an open array when admitting of extrapolation and a closed array when not admitting of extrapolation. A systematic or utilitarian arrangement of members of an array is described as helpful sequence. This arrangement is described helpful, since it is helpful to the majority of the classification users though not to all. Broader clusters in an array are arranged in what is described as a Filiatory Sequence. It means placing jointly closely related classes. The order of main classes in J.D. Browns Subject Classification (1906) is in the evolutionary order of matter, force, life, mind and record. A chain is the sequence

of classes of a universe consisting of a class and of its universe of successive removes, accepted backwards to any point desired-that is, all the members are of unequal rank and are arranged in the order of constantly decreasing extension and rising intension. The order in a chain is from common to specific or in the reverse order of specific to common. For instance, the World, Asia, India, Maharashtra, Mumbai form a chain of classes in this or reversed order. Likewise social sciences, economics, fund, money, banks form another chain of classes. Your grandfather, your father, and you form a chain of classes, but all your brothers and sisters form an array of classes. The arrangement of entities in a chain is always hierarchical.

Check Your Progress

1. List the automatic document classification techniques.
2. Name the different types of shelving.
3. Mention the types of notation.

3.7 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. Automatic document classification techniques include the following:
   - Expectation maximization (EM)
   - Naive Bayes classifier
   - tf–idf
   - Instantaneously trained neural networks
   - Latent semantic indexing
   - Support vector machines (SVM)
   - Artificial neural network
   - K-nearest neighbour algorithms
   - Decision trees such as ID3 or C4.5
   - Concept Mining
   - Rough set-based classifier
   - Soft set-based classifier
   - Multiple-instance learning
2. The different types of shelving are: (i) compact mobile shelving (ii) sliding drawer system.
3. The types of notation are: (i) pure notation (ii) mixed notation.

NOTES

3.8 SUMMARY

- Knowledge organization (KO), organization of knowledge, organization of information, or information organization is a branch of Library and Information Science (LIS) concerned with activities such as document description, indexing, and classification performed in libraries, databases, archives and so forth.
- Among the major figures in the history of KO are Melvil Dewey (1851–1931) and Henry Bliss (1870–1955).
- Among the other principles, which may be attributed to the traditional approach to KO are the following:
  - o Principle of controlled vocabulary
  - o Cutter's rule about specificity
  - o Hulme's principle of literary warrant (1911)
  - o Principle of organizing from the general to the specific
- The date of the foundation of this approach may be chosen as the publication of Dr S R Ranganathan's Colon Classification in 1933.
- Domain analysis is a sociological-epistemological standpoint. The indexing of a given document should reflect the needs of a given group of users or a given ideal purpose.
- DA is the only approach to KO which has seriously examined epistemological issues in the field, i.e., comparing the assumptions made in different approaches to KO and examining the questions regarding subjectivity and objectivity in KO.
- Focusing on information extraction from semi-structured data, we have examined thousands of Web pages.
- A general term covering bibliographical classification mostly refers to library classification for arrangements of books and documents on the shelves.
- Request-oriented classification may be classification that is targeted towards a particular audience or user group.
- From the dawn of civilization man has recognized the need for collecting and preserving the records of human thought. Books and other graphic material are the records of human thoughts, action and achievement and can serve as the basis for future achievement.
- Documents can be arranged in various ways in a library, for example, by author, or by title, or by, 22 Elements of Library Classification subject or by basis such as size, language, colour of binding or any other such criterion.

NOTES

- Until the end of the 19th century library collections were small in size. Not as many subject fields had developed as one notices now, and publishing was not as widespread. The readership was not as large as we notice in the present times.
- In a busy library, shelving and shelf work is a never-ending and seemingly thankless task. The arrangement of books in the library makes them accessible and usable by library patrons.
- In addition to the standard shelving illustrated above, there are a large variety of display and special purpose shelving available for:
    - o Audio-visual materials
    - o Periodicals and paperbacks
    - o Special displays (for example, new books)
- Open stack collections give patrons complete access to the materials on the shelves. Patrons may browse and choose their own materials. The result of open access is more reshelving and maintenance to keep the collection in call number order.
- Closed stack collections are prevalent in universities, special libraries and archival collections. Since the collection is accessible only to library staff, it is generally in better call number order and requires less maintenance.
- In public and school libraries, non-fiction books are usually shelved according to the Dewey Decimal Classification (DDC) system.
- Most academic and special libraries shelve books according to the Library of Congress (LC) classification system. These call numbers are based upon groups of letters and numbers.
- Shelvers move book trucks of sorted library materials to the appropriate location to begin shelving. As the books are shelved, the shelvers should be looking for misshelved materials and routing them to the sorting area, or reshelving them properly.
- Notation is a term which is used in classification schedule. Notation is a series of symbols, which is used to representing a subject, and it is a very important features of book classification in a library.

3.9 KEY WORDS

- **Closed Stack Collection:** It refers to a collection that is not open to the general public or on a selective basis.
- **Tf-idf:** It implies short for term frequency–inverse document frequency, is a numerical statistic that is intended to reflect how important a word is to a document in a collection or corpus.

3.10 SELF ASSESSMENT QUESTIONS AND EXERCISES

NOTES

Short Answer Questions

1. What is document classification?
2. Identify the factors determining the physical arrangement of documents.
3. Write a short note on shelving and shelf-reading procedures.
4. List the functions of notation in library classification.

Long Answer Questions

1. Discuss the various approaches dealing with knowledge organization.
2. Differentiate between knowledge classification and book classification.
3. Explain the process of physical maintenance of stacks.

3.11 FURTHER READINGS

Parkhi, RS. 1960. *Library Classification: Evolution and Dynamic Theory*. Bombay: Asia Publishing House.

Raju A. 1991. *Universal Decimal Classification.* Madras: T.R. Publishers.

Ranganathan SR. 1963. *Colon Classification*. Sixth Edition. Bombay: Asia Publishing House.

Ranganathan, SR. 1965. *Prolegomena to Library Classification*, Second Edition. London: Library Association.

UNIT 4 THEORY AND DEVELOPMENT: AN OVERVIEW

Structure

4.0 INTRODUCTION

At the outset, one must know what constitutes a theory and how it is important for development of a subject. A theory refers to an organized set of principles, which provides the basis for further investigation and the development of a subject. It explains the 'what' and 'why' of the existing phenomena. It qualifies the subject to be accepted as a discipline. It provides a scientific basis for a subject and brings respectability and status to it. Its importance for the growth and development of a subject hardly needs emphasis.

In this unit, you will study about the need and development of a theory and the normative principles.

4.1 OBJECTIVES

After going through this unit, you will be able to:

- Examine the need and development of a theory
- Discuss the purpose of normative principles

4.2 NEED OF A THEORY

If we look at the history of library classification, we find that during the early stages of its development, it handled a small number of subjects constituting the whole of knowledge and a broad classification met the requirements of that time.

The schemes were prepared largely in response to the exigency of the time. These schemes seem to have been guided by the purpose on hand rather than a theory that would stand the test of time. These schemes solved the immediate and short-term problems. However, with the passage of time the number of subjects into which knowledge could be divided steadily increased, proving the existing schemes inadequate. With the growing complexity of subjects enshrined in documents it became necessary to classify knowledge minutely. This complexity called for a theory of library classification which could meet the challenges posed by the turbulent growth in knowledge.

4.2.1 Development of a Theory

In any sphere of life, practice precedes theory. Life force stimulates man to improvise, design, and develop various aids both at the physical and mental level. After a long experience is gained with an improvised aid, a theory is developed in order to understand, aid deeply and to systematize, improve, refine and develop it. So also it has been with classification. Within 50 years after the design of Decimal Classification, Richardson and Sayers made comparative studies of the then known schemes for classification; and they also evolved a Theory of Classification. It was largely an interpretative explanation. It was static and not dynamic. The emphasis at this stage, according to Parkhi in his book *Library Classification, Evolution of a Dynamic Theory*, was on the description of the practices followed by the classificationists in designing their schemes and were considered as norms for designing schemes. On the other hand, after 1949, Ranganathan and his associates slowly evolved a Dynamic Theory of Classification. The first consolidated account of this Dynamic Theory was published in 1957 in the Prolegomena to Library Classification, by Ranganathan. This was further refined after the establishment of DRTC at Bangalore in 1962, which provided facilities for enhancing the Theory of Classification and making it more dynamic and applicable both to book classification and article classification. Consequentially, active work in the design of depth classification schedules for the classification of articles progressed. The need for such a dynamic theory is obvious as it only could provide guidelines for the development of subject classification in the future.

4.3 GENERAL THEORY: NORMATIVE PRINCIPLES

The purposes of normative principles are the following:

1. The normative principles provide a base to any type of scheme of classification. The classification scheme may be based upon the guidelines as enunciated by the normative principles. The existing schemes of classification can be reproduced and revised with the assistance of normative principles.

NOTES

2. A scheme of classification can be evaluated with the help of normative principles.
3. A comparative study of two schemes of classification can be done with the help of normative principles.
4. The laws and index of any scheme of classification can be explained \with the help of normative principles.
5. Normative principles can be helpful in the development of laws of classification and in providing a scientific base.

4.3.1 Normative Principles of Some Eminent Scholars

The comparative study of the normative principles enunciated by the following scientists is given below:

(1) Ernest Cushing Richardson

Richardson provided a systematic form of principles of classification and he is known as founder father of the same. In 1901, his book, *Classification: Theoretical and Practical* was published which is unique in the field of classification. The effect of principles evolved by Richardson can be easily seen in the works of Bliss and Sayers.

According to Richardson, the classification can be based upon the under-mentioned principles:

1. All the things be put in a chronological order as far as possible. It is difficult for a human being to store all the things like a library. In order to arrange the things systematically, principle of complexing order of history, order of evolution as well as all principles which can assist in the arrangement of things be put in practice accordingly.
2. The sequence or the order of arrangement be of the finest order giving minute details of the sequence.
3. The sequence be assisted by notation. The notation be based upon decimal system. Such arrangement can help in sub-division. Mixed notations are more useful.
4. A scheme must have a specific index. Index can assist in classification but it cannot be accepted as a principle.
5. The value of such a system should grow in the order of its usefulness, however, this principles in itself is not clear.

(2) James Diff Brown

Brown developed two schemes of classification in the 1890s decade which met with a failure. The first scheme was jointly evolved in 1894 by Brown and John Henry Quinn which is known as Quinn-Brown Classification. The second scheme known as Adjustable classification was published in 1897.

NOTES

The third scheme of Brown under the heading "Subject Classification" was published in 1906 which was successful. Its second edition was published in 1914 and the third edition in 1939. Brown adopted the principle of "One Place Theory." He selected concrete thoughts for the same and tried to produce documents with the help of these concrete thoughts.

Brown atttempted to combine science with its use. He suggested that each subject should be kept with that stream of science upon which it is based, viz, technology be kept with pure science, however, the arrangement of subjects under the subject classification is unsatisfactory; for example, it is not correct to put together Principle of Heat and work of fire service.

(3) Henry Evelgn Bliss

The *Organisation of Knowledge and the System of the Science* by H. E. Bliss is a masterpiece of work. First of all he developed "Bibliographic Classification Scheme," which has a scientific, philosophical and logical base.

He was the first to use canons and he gave three principles. Bliss changed his classification scheme in 1910 and chalked out a plan in 1935 to publish its new edition in 20 volumes under the name of *A System of Bibliographic Classification.* Its four volumes have already been published.

(4) W.C. Berwick Sayers

Sayers complied all the existing practices or schemes and presented them in an organised manner. He was the first person to use the word 'Canons.' In 1918, he published the book, *Introduction to Library Classification.* In 1926, he published the first edition of the book, *Manual of Classification* the second edition in 1944 and the third edition in 1955. Its reprint was carried out in 1959.

Sayers used the word, 'Canons' and introduced 29 canons. He divided the canons into six categories:

1. **Definition:** He brought out the definition of Library Classification; Classification of Subjects, General Classification; Class and Scheme of Classification and so forth.
2. **Division:** As per Sayers, division should take place as per established rules, gradually. Division be based upon characteristics of the subjects. When some other principle is to be applied, the principle precedent is it be applied in totality.
3. **Term:** Terminology used should have clarity. The terms used should be of common usage and technical. As far as possible, standard terms be put in practice.
4. **Book Classification:** Book classification should be in a standard form. The schemes which have been arranged subject wise. It should be provided with Form Class, i.e., the books should be kept in the same form in which

these have been written. Notation should be used to represent class under the book classification.

5. **Notation:** The marks or symbols which are used to represent a word or words is known as notation. The symbols should be as simple as possible. The Notation is of two types—Pure Notation and Mixed Notation. The Notation would be so flexible that it should have enough room to include new subjects on need basis.
6. **Book Classification Schemes:** It should be in a printed form and it should include all the similar subjects. It should have forwards and necessary directions for the use of indexes.

(5) Dr S R Ranganathan

Dr Ranganathan published the first edition of Colon Classification in 1933. Though, he briefly touched upon the system of 'Canon and law" but did not explain the usage of the same. In order to provide a scientific base to the 'Library Classification,' he deeply studied the works of universal Decimal Classification, Library of Congress and Brown's Subject Classification. It resulted in the discovery of canon and new vocabulary by him. He published his works, the theory of classification in 1937 under the title of *Prolegomena, to Library*. This work contained 28 canons having detailed description usage in Colon Classification. Under the influence of these ideas, Ranganathan published the second edition of Colon Classification in 1939 which is based upon these canons.

The second edition of *Prolegomena to Library Classification* was published in 1957 which provided a flip to the Library Classification. The member of canons rose to 35 in it. This edition also had 21 Postulates and 11 principles. Its third edition was published in 1967. The important features of this edition are as as follows:

(1) 11 = Laws

(2) 43 = Canons

(3) 18 = Principles of Helpful Sequence

(4) 13 = Postulation

(5) 4 = Principles of Facet Sequence

(1) Laws

Laws are as follows:

(a) Basic Laws:

1. Law's of Interpretation.
2. Laws of Impartiality.
3. Laws of Symmetry.
4. Laws of Local Variation.
5. Laws of Osmosis.

NOTES

(b) Fundamental Laws:

1. Books are for use.
2. Every reader his/her book.
3. Every Book its reader.
4. Save the time.
5. Library is growing organism.

(2) Cannons

Canons are as follows:

(1) Canons of Ideology :

Ranganathan has divided the canons in the following steps:

1. Canons of Differentiation.
2. Canon of Relevance.
3. Canons of Ascertainability.
4. Canons of Permanence.
5. Canons of Concomitance.
6. Canons of Relevant Succession.
7. Canons of Consistent Sequence.
8. Canons of Exhaustiveness.
9. Canons of Exclusiveness.
10. Canon of Helpful Sequence.
11. Canon of Consistent Sequence.
12. Canon of Decreasing Extension.
13. Canon of Modulation.
14. Canon of Subordinate Classes.
15. Canon of Coordinate Classes.

(2) Canons for Work in the Verbal Plane

These are as follows:

1. Canon of Context.
2. Canon of Enumeration.
3. Canon of Currency.
4. Canon of Reticence.

(3) Canons of Notation:

These are as follows:

1. Canon of Synonym.
2. Canon of Homonym.

3. Canon of Relativity.
4. Canon of Uniformity.
5. Canon of Hierarchy.
6. Canon of Non-hierarchy.
7. Canon of Mixed Base.
8. Canon of Pure Base.
9. Canon of Faceted Notation.
10. Canon of Non-faceted Notation.
11. Canon of Co-extensiveness.
12. Canon of Non-co-extensiveness.
13. Canon of General Mnemonics.
14. Canon of Alphabetical Mnemonics.
15. Canon of Scheduled Mnemonics.
16. Canon of Seminal Mnemonics.
17. Canon of Extrapolation in Array.
18. Canon of Interpolation of in Array.
19. Canon of Extrapolation in Chair.
20. Canon of Interpolation in Chair.

(4) Canon of Interpolation in Chair

These are as follows:

1. Canon of Book Number.
2. Canon of Collection Number
3. Canon of Distinctiveness

(3) Principles of Helpful Sequences :

There are 18 principles of Helpful Sequence which are as follows:

1. Principle of Later in Time.
2. Principle of Later in Evolution
3. Principle of Spatial Contiguity
4. Principle of Bottom-upwards.
5. Principle of Top-downward.
6. Principle of Left to Right
7. Principle of Right to Left
8. Principle of Clockwise Direction
9. Principle of Counter Clock wise
10. Principle of Periphery to Centre

NOTES

11. Principle of Centre to Periphery
12. Principle of Away from Position
13. Principle of Increasing Quantity
14. Principle of Decreasing Quantity
15. Principle of Increasing Complexity
16. Principle of Canonical Sequence
17. Principle of Litrary Warrant
18. Principle of Alphabetical Sequence

(4) Postulates

The main categories of postulates are as follows:

1. Postulate of Basic Facet
2. Postulate of Isolate Facet
3. Postulate of Rounds for Energy
4. Postulate of Rounds for Personality and Matter
5. Postulate of Round for Space and Time
6. Postulate of Level
7. Postulate of Facet Sequence
8. Postulate of First Facet
9. Postulate of Concreteness
10. Postulate of Facet Sequence within a Round
11. Postulate of Facet Sequence within Last Round
12. Postulate of Level Cluster

(5) Principle of Facet Sequence

These are as follows:

1. Wall Picture Principle
2. Whole Organ Principle
3. Cow Calf principle
4. Act and Action Actor tool Principle

Check Your Progress

1. What are the principles laid down by Richardson for the purpose of library classification?
2. Name the two classifications developed by James Diff Brown.

4.4 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

NOTES

1. The principles laid down by Richardson for the purpose of library classification are the following:
   (i) All the things be put in a chronological order as far as possible. It is difficult for a human being to store all the things like a library. In order to arrange the things systematically, principle of complexing order of history, order of evolution as well as all principles which can assist in the arrangement of things be put in practice accordingly.
   (ii) The sequence or the order of arrangement be of the finest order giving minute details of the sequence.
   (iii) The sequence be assisted by notation. The notation be based upon decimal system. Such arrangement can help in sub-division. Mixed notations are more useful.
   (iv) A scheme must have a specific index. Index can assist in classification but it cannot be accepted as a principle.
   (v) The value of such a system should grow in the order of its usefulness, however, this principles in itself is not clear.
2. The two classifications developed by James Diff Brown are Quinn-Brown Classification and Adjustable classification.

4.5 SUMMARY

- A theory refers to an organized set of principles, which provides the basis for further investigation and the development of a subject.
- If we look at the history of library classification, we find that during the early stages of its development, it handled a small number of subjects constituting the whole of knowledge and a broad classification met the requirements of that time.
- In any sphere of life, practice precedes theory. Life force stimulates man to improvise, design, and develop various aids both at the physical and mental level.
- Within 50 years after the design of Decimal Classification, Richardson and Sayers made comparative studies of the then known schemes for classification; and they also evolved a Theory of Classification.
- Richardson provided a systematic form of principles of classification and he is known as founder father of the same. In 1901, his book, *Classification: Theoretical and Practical* was published which is unique in the field of classification.

- Brown developed two schemes of classification in the 1890s decade which met with a failure. The first scheme was jointly evolved in 1894 by Brown and John Henry Quinn which is known as Quinn-Brown Classification. The second scheme known as Adjustable classification was published in 1897.
- Sayers complied all the existing practices or schemes and presented them in an organised manner. He was the first person to use the word 'Canons.'
- Dr Ranganathan published the first edition of Colon Classification in 1933. Though, he briefly touched upon the system of 'Canon and law" but did not explain the usage of the same.

4.6 KEY WORDS

- **Theory:** It is a formal idea or set of ideas that is intended to explain something.
- **Canon:** It refers to a collection of rules or texts that are considered to be authoritative.

4.7 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions

1. What is the need of a theory?
2. Write a short note on the development of theory.
3. List the purposes of normative principles.

Long Answer Questions

1. Critically analyse the normative principles of some eminent scholars.
2. Examine the 'canons' developed by Dr Ranganathan for library classification.

4.8 FURTHER READINGS

Parkhi, RS. 1960. *Library Classification: Evolution and Dynamic Theory*. Bombay: Asia Publishing House.

Raju A. 1991. *Universal Decimal Classification.* Madras: T.R. Publishers.

Ranganathan SR. 1963. *Colon Classification*. Sixth Edition. Bombay: Asia Publishing House.

Ranganathan, SR. 1965. *Prolegomena to Library Classification,* Second Edition. London: Library Association.

NOTES

BLOCK - II
FUNDAMENTAL CATEGORIES

UNIT 5 OVERVIEW OF FUNDAMENTAL CATEGORIES

Structure

5.0 INTRODUCTION

The complete universe of knowledge has been divided into three areas – Natural sciences, Humanities and Social Sciences. The main classes originate from these three areas. These main classes were established conventionally. These main classes had been devised by the scholars in the form of departments of knowledge and research in various countries. These main classes are existent today also for the same objective.

In this unit, you will study about facet analysis, principles of inversion and facet sequence and principles of helpful sequence.

5.1 OBJECTIVES

After going through this unit, you will be able to:

- Explain facet analysis
- Discuss principles of inversion and facet sequence and principles of helpful sequence

5.2 FACET ANALYSIS

NOTES

After organizing the universe of knowledge into the definite main classes, the limit for the main class facets is decided. The subjects are kept under the possible facets of the main class. The specific subjects are kept under each facet in the helpful sequence. If need be, the facets can be divided into sub-facets also.

In consideration of the facets, Dr Ranganathan has written, "Facet is not only the characteristic of the class numbers, and neither the facets are unusual for the classification scheme. On the contrary, the facets are latent in the subject, whether they are known to us or not. By making the facet analysis the basis for the classification scheme and by expressing the facets of the class numbers in an explicit manner only, the subjects could be exhibited in a useful form, and their arrangement under the classification scheme could be done in the helpful sequence. If each facet is kept indivisible in the method of class number formulation, could this sequence prove to be more useful."

It is clear from the aforesaid definition that in the process of the division of the universe of knowledge, the term 'facet' is used at a specific level. When the universe of knowledge is divided into main classes, the facets are not visible at that time. But, when the main classes are divided, the concept of facet becomes visible. In fact, the objective of facets is to divide the main class into its possible points of view, the unlimited thoughts or substances latent in a main class are collected in the facts. The facets of a subject are determined with the help of the characteristics used for the division of the subjects. There are innumerable characteristics for carrying out the division subject and one characteristic produces one facet.

This way, the facet analysis is a process of systematizing the ideas of the universe of knowledge. It is a technique to identify the facets and categories which are latent in a main class.

The term "facet analysis" has been defined by the various scientists in the following manner:

According to **Metcoff**: "Facet analysis can be called the subject analysis of the specific books, which book be manifested by the class numbers. The analysis carried out to find out the basis for the analytico-synthesis of classification is also called facet analysis."

According to **Pamar** and **Welace**: "Analysis of a specific subject produced as a result of the experiment of the various characteristics is called facet analysis."

Accoridng to **Dr. Ranganathan**: "Facet analysis is the description of those possible chains of characteristics on the basis of which a main class in divided."

Really speaking, the complete process of determining the facts of a subject is called facet analysis. At the time of dividing a subject, it is divided into separate facets and the possible substances are mentioned. At the time of the classification of books, their latent substances and related facets are examined. In most of the

books, one facet is related to the isolate of another subject or the isolate of another subject. To segregate this type of relation, the facet analysis is very helpful.

Example: Let us take a hypothetical example of three books used for classification.

(A) Flowering Plant

(B) Ecology of Plant

(C) Ecology of Flowering Plants.

All these books are related to Botany. Book (A) is related to a facet of the main class-family of plants. Book (B) is related to another facet of the main class-problems of study. Both these books may be classified under different facets. But, the third book contains descriptions of the two substances Ecology and Flowering Plants. If this book is kept with any one facet, that will not be the appropriate classification. The solution to this problem is obtained only through the concept of facet analysis, under which these three books can be classified as follows:

(A) Botany + Flowering Plants	15
(B) Botany + Ecology of Plants	1 : 5
(C) Botany + Flowering Plants + Ecology of Plants	15 : 5

In this way, in book (A) personality facet, in book (B) energy facet, and in book (C) personality facet and energy facet have been used with the main class.

This way, the subject analysis method has been followed to the same extent under the Colon Classification (CC) Scheme. In fact, the complete structure of this scheme is based on the facet analysis. The facets sub-rules have been given for helping out the classification of each main class. Under each facet there is an arrangement of a schedule containing the basic terms derived from one of the characteristics.

Facet analysis as developed by Ranganathan is at the core of CC philosophy and methods. Class numbers for compound or complex subjects are not listed readymade. These have to be synthesized, or tailor-made, on the basis of the specific subject of the document. Ranganathan has given eight standard and interlocking steps to turn a raw title (as it appears on the document) into a coextensive class number based on the subject content and form of the document (Ranganathan 1987). First of all, the specific subject of a document has to be determined. Ranganathan has defined the specific subject of a document as the one whose extension and intension are square with its subject content, but does not outline practical procedure for its determination. Ranganathan calls it an intuitive or trial-and-error act for which there can be no specific rules. Indeed, it requires flair, and is learned continuously from experience. Nevertheless, a specific subject is to be determined from the title, subtitle, preface, table of contents, or even by reading the text, as when applying other knowledge organization systems. The raw title may be augmented by key words or phrases, if necessary, to fully indicate the specific subject of the document.

NOTES

Next, the subject proper must be separated from the common isolates, which represent the tangible bibliographic elements of the document, or viewpoint of the author. Then the main class in which the specific subject falls is determined. Main classes and other basic classes are postulated by the system—these are the givens, not to be challenged by a classifier. Ranganathan postulates that every subject belongs to one and only one basic subject, which forms the first facet. Then starts the facet analysis per se into PMEST categories. The system suggests identification and separation of the categories in a subject in the order from [T] to [P], moving from the easiest category to the most elusive one. Broader categories are further resolved into specific facets.

Categories tend to evade definition. Their nature is somewhat elusive, though not metaphysical. These are still postulated and require much experience and flair to recognize them. For example, the personality category occurs in all the main classes, yet it is difficult to say what in general it is. The nature or constituents of categories vary from main class to main class. Their deceptive nature is clear from the fact that what had been the energy category in the fourth to sixth editions became, all of a sudden, the matter category in the seventh edition. At times, it is utterly confusing to categorize an entity clearly. For example, in the class music, musical instruments such as guitar, drum, flute and others, are designated as matter category, so are books and other documents in library science. Therefore, if something puzzles us, the only solace seems to acquiesce in the way desired by Ranganathan.

The Postulate of Impersonation of categories adds to the confusion—that is, a category may masquerade as some other category, e.g., a country is [P] in N Fine arts, V History and Z Law, but [S] in other social sciences. Also the context changes the category: Gold is [M] in numismatics but [P] in E Chemistry and HZMineralogy. In practical classification we start with identifying [T] and come down to [P] via [S], [E] and [M]. Time indicated by the apostrophe, is chronological, diurnal, or seasonal. Its examples are twentieth century, medieval period, summer season, or morning time and so forth. Space indicated by a dot is the manifestation of geographical and political areas or population clusters, for example, Asia, London, French speaking countries, NATO, G8, hilly or desert areas, Iberian Peninsula, or Colorado valley. Energy, indicated by a colon, manifests actions, activities, processes, and problems. For example, treatment, storage, diseases, teaching, management, or grammar etc. are instances of energy. Earlier [M] was confined to the material of the entity, such as wooden chairs, marble sculpture, or gold coins. In the latest edition, Ranganathan has widened the scope of matter by recognizing three variants of this category:

Matter-Property [M-P]

Matter-Method [M-M]

Matter-Material [M-Mt]

For all three, the indicator symbol is semicolon. Of all the fundamental categories, personality [P] is the most concrete, but, paradoxically, the most difficult to recognize. Like human personality it is a complex entity and thus elusive. Ranganathan recommended the Residual Method to spot it in the facet analysis of a subject. It means that after identifying [T], [S], [E], and [M], categories, if anything still remains in the residue, then it might be personality—as a corollary of the "five and only five fundamental categories". But this method does not work all the time, especially when there are more facets than categories. M.A. Gopinath (1985) later maintained that the residual method was no longer necessary for this purpose. Personality is incarnate in persons (individuals or groups), communities, institutions, animal and plant families, body organs, chemical elements, agricultural products, languages, religions, art styles, political systems or ideologies, laws and the like. It is indicated by a comma.

5.3 POSTULATES OF FACET SEQUENCE

After the identification of facets of a compound subject, the next task is to arrange these facets in helpful sequence. Dr Ranganathan has expounded many postulates for this purpose as given below:

(1) Postulates of First Facet: "The basic facet in a compound subject should be the first facet." (Prologuemena p. 412). It implies that position of the first facet out of the various facets should be determined according to the position of first facet. As we know, that no single facet can form any subject till a basic facet is joined to it. The helpful sequence demands that all the subjects related to a basic facet should be systematically arranged at one place together. This can only be possible if the basic facet is given the first place.

(2) Postulates of Concreteness: Each facet of a compound subject manifests any one fundamental category. Arrangement of these facets should be done in accordance with the postulates of concreteness, which implies that the most concrete facet should be placed before all other facets, and the most inconcrete facet should go to the last place.

Example: Personality facet is the most concrete and least inconcrete, whereas the (T) facet is the least concrete and most concrete among all the facets. The arrangement of the facets of a subject under the postulate of concreteness, therefore, be as follows:

P, M, E, S, T

If the above two postulates (Postulate of First Facet & Postulate of Concreteness) are used jointly, a compound subject could be arranged in the following sequence:

(BC) (P) (M) (E) (S) (T)

(3) Postulates of a level Cluster: According to this postulate, all the levels used in relation to a fundamental category in a compound subject should be kept together, which implies that all the levels related to any fundamental category should be consecutively arranged in the sequence of 1, 2, 3, 4. After using all the levels compact in one round of the fundamental category, the levels of the second fundamental category should be used.

5.4 PRINCIPLES OF INVERSION AND FACET SEQUENCE

In determining the helpful sequence among the various categories compact in a compound subject, the postulate of concreteness has proved to be helpful. This postulate will, however, prove to be useless to determine sequence among two or more personality isolate views, two or more matter isolate views, two or more energy isolate views, two or more place isolate views, two of more time isolate views related to any one category. Dr Ranganathan has expounded several principles from the point of view of providing helpful sequence to more than isolate views (whether they have been manifested in the form of rounds of that category, or in the form of levels) compact in one category, which has proved helpful the form of levels) compact in one category, which has proved helpful to solve the above problem and to provide guidance to the classifier. These principles are as follows:

(1) Wall Picture Principle: This principle was devised by Dr Ranganathan in 1962 to provide a definite sequence to the isolate views related to only one fundamental category.

According to this principle, if there are two facets 'A' and 'B', and the 'B' facet cannot be activated without 'A' facet, the facet 'A' should be kept before the facet 'B'. As for the wall painting, the existence of a wall is compulsory because no painting could be brought into existence in the absence of a wall, so also that facet should have the precedence over the other facet which is dependent on that facet.

The Wall Picture Principle has proved to be the main principle in the arrangement of the facet sequence. This principle is also used to decide the sequence of the characteristics. For the arrangement of numbers of facets the group principle is used. In such a condition, it is difficult to follow this principle. For determining the concept of any subject or the rounds it is done through the sequence of the five fundamental categories PMEST. The same sequence is followed in the Wall Picture Principle.

Under the Colon Classification Scheme, this principle has been used to provide sequence to two views of one facet compact in any subject.

Example: Treatment of Disease – L: 4 : 6

The above subject is related to the main class L Medicine. Here, Disease is (E) facet, and Treatment is (2E) facet. The idea of treatment is not possible without

disease, therefore, the term 'disease' has been kept first followed by the term 'treatment'.

In 'Hindi Drama,' the word 'Drama' follows the word 'Hindi,' therefore, the word 'Hindi' will come first followed by the word 'Drama'.

In *Godan* by Premchand (Hindi Novelist)', the concept of Premchand is negligible without novel, i.e., *Godan*, and the concept of novel without the term 'Hindi' is meaningless. It will be, therefore, presented as 'Hindi Novel. Premchand's *Godan*.

In 'Application of manure,' application is not possible without manure, therefore, the term 'manure' will be kept before 'application.'

1 : 2 : 3

(2) Whole Organ Principle: Whole implies complete being, and organ implies the working organs, divisions, and part of the whole. According to this principle, if any subject facet 'B' has been used in the form of the organ of 'A' facet should be kept before 'B' facet, which implies that the isolate facet describing the whole should be kept before the facet describing the organ because the idea of organ without the whole is impossible.

Example: In 'Judiciary of India' the judiciary is an organ of India facet, therefore, 'India' will be kept before 'Judiciary.' Likewise, in the universe of vegetation, the various types of vegetation are the 'whole', and their roots, leaves, flowers and fruits are their working organs.

(3) Whole Organ Principles v/s Wall picture Principles: The whole organ principle is, in fact, a sub-principle of the Wall Picture Principle. The sequence obtained on the basis of the whole organ principle could also be obtained through the Wall Picture Principle, however, care should be taken that Whole Organ Principle should only be used where the relation is in the form of whole organ; whereas the Wall Picture Principle is not bound by any condition. The Wall Picture Principle is generally used to determine sequence in between two energy isolates.

Example:

Indian Parliament V44, 3

(on the basis of whole organ principle)

Treatment of eye inflammation L185 : 415 : 6

(on the basis of Wall Picture Principle)

(4) Cow-Calf Principle: If facet 'A' and facet 'B' of a subject are related to each other in such a way that it is not possible to separate them, even if they apparently appear to be separate, in such a condition both the facets 'A' and 'B' should be kept together. Dr Ranganathan has given this principle the name of 'cow-calf principle'. Like the buyer of a cow acquires the ownership of the calf because the calf which is still nursing on the milk cannot be separated from the cow. Likewise, the two closely related facets of a subject should be kept together, and should not be separated from each other.

NOTES

Example: Transmission of electricity D66, 2

Both the facets of the aforesaid heading are so closely related to each other that they are inseparable, in other words, the 'transmission' cannot be separated from 'electricity' like calf from the cow.

(5) Actand Action –Actor Tool Principle: According to this principle, if in any subject facet 'B' shows its activeness on the facet 'A', and on the facet 'D' through the facet 'C', in such a case, the sequence of all these facets should be A, B, C, D, which implies that the influenced facet on which depends the action, will be the first facet, and the instrument will go to the last.

Dr Rananathan has expounded one another principle known as "Principles of Commodity-raw-material-transformation-transformer tool." This principle is also similar to the foregone principle, only the term 'Commodity' has been added to it.

Example: Machine Cotton Spinning by Women:

Machine	Tool
Cotton	Actand
Spinning	Action
Women	Actor

The sequence according to the above principle will, therefore, be Cotton, Spinning, Women, Machine.

5.5 PRINCIPLES FOR HELPFUL SEQUENCE

The Principles for Helpful Sequence are concerned with order in array, i.e., the order in which foci (or individual terms) are arranged within their respective facets. Ranganathan does not mandate any one particular order and provides examples of several types of arrangements. As shall be seen, a degree of redundancy occurs in these Principles.

The Principle of Later-in-Time suggests that if items have originated in different times, they should be arranged in a progressive time sequence that reflects this order. The Principle of Later-in-Evolution suggests that if items belong to different stages of evolution, they should be arranged in the appropriate evolutionary sequence. It would appear that both these principles are concerned with chronological order and, thus, could be coalesced easily.

Ranganathan has seven Principles of Spatial Contiguity, namely:

(i) Principle of Bottom Upwards

(ii) Principle of Top Downwards

(iii) Principle of Left to Right

(iv) Principle of Clockwise Direction

(v) Principle of Counter-Clockwise Direction

(vi) Principle of Periphery to Centre

(vii) Principle of Centre to Periphery

NOTES

These seven principles suggest that items could be arranged in a spatial or geometric order (for example, the position of planets in our solar system in relation to the sun). The principles take into account the actual spatial position of items, for example, to use the solar system. Say for instance, the planets could be arranged in a left to right position, with the sun being at the furthermost right position. These principles are another example of Ranganathan providing rather more detail than is necessary. It might perhaps be enough to suggest that foci could be arranged in a spatial or geometric order and forgo seven principles that are concerned with specific spatial arrangements.

There are two Principles of Quantitative Measure, namely, the principles of Increasing Quantity and Decreasing Quantity. An example of the former principle would be the arrangement of the foci Prime Minister-Executive Party-Public. The latter principle would arrange these foci in reverse order, namely, Public-Executive Party-Prime Minister.

The Principle of Increasing Complexity suggests that foci could be arranged in a simple-complex order, for example, Geography-Mathematical Geography-Physical Geography. The *Principle* of Canonical Sequence suggests that if foci are traditionally arranged in a specific sequence, one should conform to this sequence. The Principle of Literary Warrant suggests that foci may be arranged in a sequence that reflects the decreasing quantity of documents published (or anticipated to be published) on them. This principle could be very problematic to enforce and to maintain, since publication trends are tenuous at best, and could result in a rather shaky foundation upon which to base order in array.

The final principle is that of Alphabetical Sequence, i.e., that foci be arranged in a purely alphabetical order. This principle is a catch-all, if you will, for those occasions when no other logical sequence of foci is available. Furthermore, it could be argued that this sequence is the most objective way of arranging foci, as it reflects no bias or preference on the part of the classificationist.

Postulates

Ranganathan's 15 Postulates govern the choice and citation order of fundamental categories/facets. The Postulate of Five Fundamental Categories assumes that all subjects can be divided into five fundamental categories: Personality, Matter, Energy, Space, and Time (PMEST). The *Postulate of Basic Facet* states that every compound subject has a basic facet, for example, the subject AGRICULTURAL DISEASES has AGRICULTURE as its basic facet, whereas ANIMAL HUSBANDRY is the basic facet for the subject CARE OF COWS. The *Postulate of Isolate Facet* states that every facet in a compound subject is a manifestation of one and only one of the five fundamental categories, for example,

NOTES

an individual facet cannot represent both Personality and Matter. This postulate seems rather intuitive, especially if facets are mutually exclusive and represent only one characteristic of division.

The Postulates governing the Rounds of Manifestation and Levels of Manifestation are concerned with the citation order of facets (or, schedule order). It is perhaps in these two areas that Ranganathan causes the most confusion to LIS students. These Postulates are rather difficult to understand and apply, and demonstrate a somewhat arbitrary and inflexible approach towards the organization of classification schedules that might not necessarily be apparent to anyone but Ranganathan. The Postulates of Rounds for Energy, Rounds for Personality and Matter, and Rounds for Space and Time are based on the primary assumption that the five fundamental categories must be ordered in the sequence P-M-E-S-T.

In summary, the first manifestation of "E" ends what Ranganathan terms Round 1 of the sequence P,M,E, for example: **Disease [1M] Prevention [1E]**. If any of these categories occurs a second time in the same subject, they would be placed in Round 2, for example: **Disease [1M] Prevention [1E] Chemicals [2M]**. The categories Space and Time may appear only in Round 2.

The *Postulate of Level* stipulates that any of the categories P,M,E,S,T may appear more than once in a single Round: the first manifestation of a category within a round is said to be Level 1, and so forth, for example: **Disease [1M] Prevention [1E] Chemicals [2M1] Toxins [2M2]**. In this case, [2M1] stands for Round 2, Level 1 Matter Facet, and [2M2] for Round 2, Level 2 Matter Facet. The Postulates for Facet Sequence (First Facet, Concreteness, Facet Sequence within a Round, Facet Sequence within the Last Round, and Level-Cluster) govern the order in which facets are to be arranged within a single round. Once again, one is in danger of being overwhelmed by the amount of information provided by Ranganathan, and the details needed to explain these Postulates exceeds the scope of this work. It is sufficient to say that the Postulates pertaining to Rounds and Levels are difficult to understand and apply and one is hindered further by the fact that Ranganathan never explains clearly what is meant by the category P.

Check Your Progress

1. Define facet analysis.
2. In which year was the Wall Picture Principle devised by Dr Ranganathan?
3. What does the principle for helpful sequence suggest?

5.6 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

NOTES

1. Facet analysis is a process of systematizing the ideas of the universe of knowledge. It is a technique to identify the facets and categories which are latent in a main class.
2. In the year 1962, the Wall Picture Principle were devised by Dr Ranganathan.
3. The Principles for Helpful Sequence are concerned with order in array, i.e., the order in which foci (or individual terms) are arranged within their respective facets.

5.7 SUMMARY

- The complete universe of knowledge has been divided into three areas – Natural sciences, Humanities and Social Sciences. The main classes originate from these three areas. These main classes were established conventionally.
- After organizing the universe of knowledge into the definite main classes, the limit for the main class facets is decided. The subjects are kept under the possible facets of the main class.
- The facets of a subject are determined with the help of the characteristics used for the division of the subjects. There are innumerable characteristics for carrying out the division subject and one characteristic produces one facet.
- Facet analysis as developed by Ranganathan is at the core of CC philosophy and methods. Class numbers for compound or complex subjects are not listed readymade. These have to be synthesized, or tailor-made, on the basis of the specific subject of the document.
- The Postulate of Impersonation of categories adds to the confusion—that is, a category may masquerade as some other category, e.g., a country is [P] in N Fine arts, V History and Z Law, but [S] in other social sciences.
- In determining the helpful sequence among the various categories compact in a compound subject, the postulate of concreteness has proved to be helpful.
- The *Principles for Helpful Sequence* are concerned with order in array, i.e., the order in which foci (or individual terms) are arranged within their respective facets.
- The *Principle of Increasing Complexity* suggests that foci could be arranged in a simple-complex order, for example, Geography-Mathematical Geography-Physical Geography.

NOTES

- Ranganathan's 15 Postulates govern the choice and citation order of fundamental categories/facets. The *Postulate of Five Fundamental Categories* assumes that all subjects can be divided into five fundamental categories: Personality, Matter, Energy, Space, and Time (PMEST).
- The Postulates governing the *Rounds of Manifestation* and *Levels of Manifestation* are concerned with the citation order of facets (or, schedule order). It is perhaps in these two areas that Ranganathan causes the most confusion to LIS students.

5.8 KEY WORDS

- **Foci:** It refers to the point of attention.
- **Spatial:** It is used to describe things related to areas.
- **Postulate:** It is a statement accepted as true for the purposes of argument or scientific investigation.

5.9 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions

1. Write a short note on the meaning of facet analysis.
2. Briefly mention the postulates of facet sequence.
3. List the seven principles of spatial contiguity.

Long Answer Questions

1. Analyse Dr Ranganthan's contribution to the development of facet analysis.
2. Explain the principles of facet sequence.
3. Critically analyse the 15 postulates devised by Dr Ranganthan which govern the choice and citation order of fundamental categories/facets.

5.10 FURTHER READINGS

Parkhi, RS. 1960. *Library Classification: Evolution and Dynamic Theory*. Bombay: Asia Publishing House.

Raju A. 1991. *Universal Decimal Classification.* Madras: T.R. Publishers.

Ranganathan SR. 1963. *Colon Classification*. Sixth Edition. Bombay: Asia Publishing House.

Ranganathan, SR. 1965. *Prolegomena to Library Classification,* Second Edition. London: Library Association.

UNIT 6 CANONS OF CLASSIFICATION

NOTES

Structure

6.0 INTRODUCTION

Canon means a rule, regulation or law. It can also be defined as a principle, model, standard or criterion. Hence, various models, principles, test used for the working and efficiency of different schemes of classification are called Canons of classification. A scheme for classification implies the prior concept of scheme of classes and involves the following five inherent concepts which essentially belong to the idea plane.

In this unit, you will study about the canons of classification, postulates and postulation approaches, zone analysis, systems and special phase analysis.

6.1 OBJECTIVES

After going through this unit, you will be able to:

- Explain the canons of classification
- Discuss postulates and postulation approaches
- Define zone analysis
- Examine systems and special phase analysis

6.2 CANONS

NOTES

Let us go through the various canons of classification.

(a) Canon for Characteristics

Every object, body, organism, thing or entity possesses certain peculiarities, specialties and features or attributes. At times, we group certain entities according to their special features and separate certain things according to their peculiarities. This classification is the arranging of things according to their similarities and dissimilarities.

Different principles that recommend certain characteristics to be selected for the process of classification are called "Canons for characteristics". Dr Ranganathan has given the following four canons of characteristics.

(i) Canon of Differentiation

(ii) Canon of Relevance

(iii) Canon of Ascertainability

(iv) Canon of Performance

Let us now study about these canons briefly here.

(i) Canon of Differentiation: The canon of differentiation states that a characteristic used as the basis for the classification of a universe should differentiate some of its entities, that is, it should give rise at least to two classes, or ranked isolates.

In the example of a classroom, the students may be divided into two distinct groups, i.e., boys and girls on the basis of sex. But we cannot divide the class on the basis of such attributes as students who have a face because all the individuals of the class share these attributes.

(ii) Canon of Relevance: The canon of relevance stipulates that a characteristic used as the basis for classification of universe should be relevant to the purpose of the classification. It may be noted that not all the characteristics possessed by the entities of a group are relevant for the purpose of classification.

For example, the selection of some sportsmen in the playfield. The colour, beauty and so forth would be irrelevant characteristics, but physical strength and physical fitness are relevant characteristics or taking the universe of book, it suits the needs of the library, reader, subject matter, language, date of publication and author—all are relevant. The size, pages, print and format are irrelevant.

(iii) Canon of Ascertainability: According to the canon of ascertainability, a characteristic used as the basis for the classification of a universe should be definite and ascertainable. For example, if the universe of authors is to be divided for their literary works; the date of birth if

selected as a characteristic will be ascertainable than the date of death which may not be ascertained at different times.

(iv) Canon of Performance: The canon of performance states that a characteristic used as the basis for the classification of a universe should continue to be unchanged, as long as there is no change in the purpose of classification. The canon demands that the characteristics once closed should have a permanent value and should not be changed unless the purpose of classification is changed.

For example, if a scheme of classification divides various books available in a library according to the publishers as well as the physical make-up of the books. However, with the passage of time the physical make-up of the publisher can be changed in the later editions and, hence, the characteristics chosen for dividing the universe of books was not of permanent value and that the canon of permanence is violated.

(b) Canon for Succession of Characteristics

To guide the succession of characteristics Dr S R Ranganathan has formulated the following three canons.

(i) Canon of Concomitance

(ii) Canon of Relevant Succession

(iii) Canon of Consistent Succession

The above canons are common sense canons. Let us now study about them briefly here.

(i) Canon of Concomitance: The canon of concomitance states that no two characteristics should be concomitant, that is, they should not give rise to the same array or subjects or of isolated ideas. The word concomitance generally means 'accompanying.' For example, deafness and failing eyesight are concomitant of old age. This means that no two characteristics should divide a subject into the same subdivision.

(ii) Canon of Relevant Succession: The canon of relevant succession stipulates that the succession of the characteristics in the associated scheme of characteristics should be relevant to the purpose of the classification.

For example, in the main class chemistry in CC edition I, the problem facet was kept as the first facet and subject facet as the second one. But the users found it to be inconvenient. The sequence-substance and problem are found to be more relevant. Hence, this was changed in the next edition of CC.

(iii) Canon of Consistent Succession: According to canon of consistent succession, the succession of the characteristics in the associated scheme of characteristics should be consistently adhered to, as long as there is no change in the purpose of the classification.

NOTES

This canon demands that the sequence of application of chosen characteristics should be followed consistently.

For example, D C has chosen 'Geographical area' and 'period' as the required characteristics in the main class history. The users of DC should follow the same characteristics in the same succession.

(c) Canon for Array

An array is the sequence of the classes of a universe derived from it on the basis of single characteristic and arranged themselves according to their ranks.

The various classification schemes in the universe of knowledge have been divided into various coordinate classes independent of each other. These classes are said to be an array of classes. In the second stage, each of the main classes is divided into sequence of facets in any array as subdivisions of a subject.

University Students		
Undergraduates	**Postgraduates**	**Doctorate**

For Example, PMEST are the five facets in which almost every main class has been divided in Colon Classification (CC). Dr Ranganathan has enunciated four canons for the formation of arrays at various levels and stages. These are as follows:

(i) Canon of Exhaustiveness

(ii) Canon of Exclusiveness

(iii) Canon of Helpful Sequence

(iv) Canon of Consistent Sequence

Let us now study about them briefly here.

(i) Canon of Exhaustiveness: The canon of exhaustiveness demands that in a universe the subjects be divided as per the canon of exhaustiveness. For Example, a particular characteristic 'gender' when applied to the universe of students divide it into boys and girls and no entity is left behind in the immediate universe.

Universe of Individuals					
Children	**Adolescents**		**Adults**		**Old people**
Students' Sex					
Male			**Female**		
Adolescent	**Adult**	**Child**	**Adolescent**	**Adult**	**Child**

In D C 290 other and comparative religion

291 Comparative religions

292 Classical religions

293 Germanic religions

294 Religions of Indic origin

295 Zoroastrians

296 Judaism

297 Islam and religions derived from it

298 Other religions

NOTES

(ii) Canon of Exclusiveness: The canon of exclusiveness states that the classes in an array of classes and the ranked isolates in an array of ranked isolates should be mutually exclusive.

This canon implies that no entity should be common between the classes of an array. In other words, the classes forming an array should not overlap each other.

(iii) Canon of Helpful Sequence: The canon of helpful sequence implies that the sequence of the classes in an array of classes, and of the ranked isolates in an array and of the ranked isolates should be helpful to the purpose of those for whom it is intended. The canon demands that the sequence of coordinate class in an array should be most helpful to the various users of classification.

To arrange the classes of an array in a helpful order, or in other words, to implement the canon of helpful sequence, Ranganathan formulated certain guidelines in the form of principles of helpful sequence. These principles are listed below:

(i) Principles of later in time

(ii) Principles of earlier in time

(iii) Principles of later in evolution

(iv) Principles of earlier in evolution

(v) Principles of spatial contiguity

(vi) Principles of increasing quantity

(vii) Principles of decreasing quantity

(viii) Principles of increasing complexity

(ix) Principles of decreasing complexity

(x) Principles of canonical sequence

(xi) Principles of decreasing literary warrant

(xii) Principles of increasing literary warrant

(xiii) Principles of alphabetical sequence

(d) Canon for Chain

A chain is defined as a group of subordinate classes in which each successive class is derived from the preceding class. Each class of a chain is called a link.

NOTES

For example:

World
↓
Asia
↓
India
↓
Maharashtra
↓
Mumbai

In progressive classification, when such a chain is formed, they should satisfy the following two canons.

(i) Canon of Decreasing Extension

(ii) Canon of Modulation

Let us now study about these canons briefly here.

(i) Canon of Decreasing Extension: It states that while moving down a chain from its first link to its last, the extension of the classes or of the ranked isolates, as the case may be should decrease and intension should increase at each step.

Extension is quantitative and intension is qualitative.

For example:	World	Order 0
	Asia	Order 1
	India	Order 2
	Maharashtra	Order 3

(ii) Canon of Modulation: In a chain of classes there should be a link to represent each and every order that lies between the order of the first link and the last link in the chain. For example, as shown in the previous example, if Asia or India or Maharashtra is missing, the chain would be described as un-modulated.

(e) Canon for Filiatory Sequence

Filiatory sequence consists of two cannons as mentioned below:

(i) Canon of Subordinate Classes

(ii) Canon of Coordinate Classes

Let us now study about these canons briefly here.

(i) Canon of Subordinate Classes: If in a classification scheme A1, A2, A3, etc. are subdivisions of A, A1, A2, A3, etc. should immediately

follow A. No other class should intervene in between A, A1, A2, A3, etc. in becoming a coalesced array.

(ii) Canon of Coordinate Classes: In a coalesced array if class A and Class B had originated in one and the same array and are consecutive in it; A and B should be kept together. They should not be separated by any other class or classes other than the sub division of A i.e. A1, A2, A3, and so forth.

II Canons of Verbal Plane

In verbal plane terms are used to denote, that is, to name the classes or ranked isolates in scheme for classification. Canons for terminology are as follows. The terminology in a scheme of classification should satisfy the following four cannons:

(i) Canon of Context

(ii) Canon of Enumeration

(iii) Canon of Currency

(iv) Canon of Reticence

Let us now study about these briefly here.

(a) Canon of Context: The denotation of a term in a scheme of classification should be determined in the light of different classes or ranked isolates of lower order (upper link) belonging to the same primary chain.

For example,

Agriculture — here the denotation of the term India is to be determined in the light of

↓ — upper links (Rice, Agriculture)

Rice

↓

India

(b) Canon of Enumeration: The denotation of a term should be determined in the light of subclasses or ranked isolate (lower links). For example, in DC subdivision of the class "Arithmetic" includes only "lower Mathematics" whereas CC includes both "lower Mathematics" and "higher Mathematics."

(c) Canon of Currency: The term used in a scheme of classification must be the one current in usage among the users. Obsolete one is to be replaced with the current terms.

(d) Canon of Reticence: The term used in a scheme of classification should not be critical.

III. Canons of Notational Plane

Notation is defined as a system of symbols, correlative to the order of classification and its subsidiary.

NOTES

Aims of Notation

It provides a clear alternative name to the subject. It is distinguishable from all other symbols. One should relate the subject to subordinate, coordinate, subordinate and collateral subjects.

Role of Notation

It is basically an ordering device. It assists in guiding of a library. Synthesis in number building leads to enormous economy in the construction and the physical size of schedule.

Qualities of a Good Notation

A good notation should have the following qualities of simplicity, brevity, synthesis, mnemonics and flexibility.

Types of Notation

They are of two types: pure and mixed notation. The notational system of a scheme for classification should satisfy two basic cannons.

(i) Canon of Synonym

(ii) Canon of Homonym

6.3 RECENT DEVELOPMENTS IN CLASSIFICATION

Let us go through the developments that have taken place in the field of classification in recent times.

(a) Construction of Thesauri: Various thesauri have been constructed with the help of classification schemes because these schemes function as the big sources for selection and getting most of the used terms in thesauri. Hence, so many research projects have been established for construction of thesauri.

(b) Standard Switching Language: Due to the explosion of knowledge, the need of standard switching language was felt for timely use in indexing terms and in indexing language. And Universal Decimal Classification (UDC) was treated suitable for using this switching language, as it was at that time suitable for computerized retrieval and dissemination of information. The International Federation for Information and Documentation (FID) is using UDC for constructing thesauri and terminology.

NOTES

(c) Automated Classification: By doing so many experiments in the field of automated classification process and system, the efforts have been made to develop the same. The use of automated classification in specific database is becoming more helpful.

(d) Computerized MARC Project: The information storage is being done in micro and machine readable forms. Hence, it is needed to develop such a classification scheme which can be useful in this age of information technology. Library of Congress (LC) and Decimal Classification Scheme are being used in MARC project.

(e) Unisist: UNISIST planned for a universal information system and network, for which the need is to provide classification schemes in a new pattern; as the present classification schemes do not have the efficiency of organizing the computerized stored information.

6.3.1 New Trends in Classification

The following trends are seen on the basis of various surveys conducted in the field of library classification.

(i) The use of LC and DDC is increasing day by day.

(ii) The trend of using UDC is also increasing day by day.

(iii) The use of SC in Britain is becoming less and in place of it the use of DDC is continuously increasing.

(iv) The use of LC in the libraries of colleges and universities in USA is increasing. But DDC is being used more than LC in the three types of libraries.

(v) The use of UDC is increasing in the special libraries of most of the countries. Its use is increasing in information and documentation centres also.

(vi) The SC was used in the public libraries of UK, but now they have begun the use of DDC because it is up-to-date.

(vii) It is felt that at present no classification scheme is suitable to classify the computerized stored information. But being revised, the LC and DDC will be existential in future. The use of UDC is also possible in special libraries.

(viii) The efforts are being done in the direction of centralized classification service. The MARC project of LC and BNB have been active in the field of library classification.

6.3.2 Contributions of International Research Groups in Library Classification

(a) FID/CR

The role of FID is most important in the field of research in library classification. The committee named FID/CA was constituted with the same objectives in 1946,

NOTES

but in 1962 its name was changed to FID/CR (Classification Research). At that time, 62 countries were the members of this committee, so its influence was more on the international level. This committee organized two international conferences, to consider the matters concerned with classification research, respectively in 1964 at Elsinore and in 1975 at Bombay. A new separate section named FID/CR News was opened in 1991, which publishes the articles on classification research. Dr Ranganathan of India, has played a significant role in FID/CR and he remained a Reporter General of this committee for a long time.

The effective tool that performs this function is the library catalogue on which the librarians concentrate to make it adequate and satisfactory for retrieving information. So, much depends on the intrinsic and extrinsic quality of the catalogue which brings the reader's needs into relation with the intellectual contents of the library.

Cataloguing involves certain steps which should be understood by the users also. The cataloguing process entails the establishment of the heading, bibliographical description of a particular book or other material for the entry, determination of classification number, assignment of subject headings, labelling and filing of catalogue cards in cabinet.

The word 'catalogue' comes from the Greek phrase *Katalogos*. Kata means "according to" or "by". *Logos* has different meanings. Sometimes, it means simply "words", sometimes "order" and at other times "reason". We may, therefore, explain "catalogue" as a work in which the contents are arranged in a "reasonable" way in a particular "order" or according to set "plan".

Generally speaking, a library catalogue is a list of books and other materials in a particular library, arranged according to a definite plan or determined order and containing specified items of bibliographical information for the purpose of identification and location of the materials catalogued.

According to C.A. Cutter, "A library catalogue is a list of books which is arranged on some definite plan. As distinguished from a bibliography it is a list of books in the same library or collections."

6.3.3 Additional Canons

Let us study some more canons.

1. Canons of Ascertainability

"The choice and rendering of main entry and specific added entry and the heading and any other element in either entry should be determined by the information found on the title page of the document and its overflowing pages. In extreme cases, information may be taken from the other pages of the work, but in no case from out of the work."

Ranganathan was of the opinion that the information needed for the Main Entry, each section of a Cross-Reference Entry, the heading of each Book Index

Entry, all sections other than the heading and directing section of a Cross Index Entry and each section other than the directing section of a Cross-Reference Index Entry other than the name entry should be ascertained from the title page and other pages of the book.

NOTES

2. Canon of Prepotence

"The potency to decide the position of an entry among various entries in a catalogue should if possible be concentrated totally in the leading section and even there it should be concentrated as much as possible in the entry element and further if total concentration in the leading section is not possible. The minimum possible potency should be allowed to overflow beyond it to the later section and even this spill-over should be distributed in the later section in a decreasing sequence of intensity."

The essence of library catalogue is arrangement of entries. The entries get sorted letter-by-letter or digit-by-digit beginning with the very first of these found in an entry. The potency goes on decreasing downwards from the first letter or digit. Any mistake in the first letter or digit will, therefore, be fatal. The entry will virtually be lost in some far off region of the catalogue. The range within which the entry may get lost goes on decreasing as we move on from the first letter or digit to the last.

3. Canon of Sought Heading

"The decision whether an entry with a particular type of heading or with a particular choice for the heading, or with a particular rendering of the choice, or with a particular added entry arising out of it should be based on the answer to the question. Is the reader or library staff likely to look for a book under the particular type or choice or rendering of heading?"

The answer to this question is matter of judgment. The judgment should be based on experience in reference service, i.e., by eliciting from readers their requirements, experience in book selection and so forth.

4. Canon of Context

"The rule in a catalogue code should be determined in the context of the nature of the cataloguing features of a book prevalent in the mode of book production, the nature of organization of libraries prevalent in regard to mode and quality of library service, and the coming into existence of published bibliographies and particularly bibliographic periodicals." The rules of a catalogue code should be changed from time to time to keep step with changes in context.

5. Canon of Permanence

"No element in an entry and the heading in particular should be subjected to change by the rules of a catalogue code except when the rules themselves are changed in response to the Canon of Context." Canon of ascertainability helps Canon of Permanence by prescribing to use the information available in title page

and overflow pages of a work and one need not go the market place to ascertain as to which is the latest names, what was the earlier title and so forth.

6. Canon of Currency

NOTES

"The term used to denote a subject in a subject heading of a dictionary catalogue and of a class Index Entry in a classified catalogue should be one in current usage".

The Canon of Currency has to face a dilemma. The question is current among whom? "The specialist or non-specialist." It is advised to use the term current among non-specialists. Because specialist knows the term current among non-specialists but not vice-versa.

7. Canon of Consistence

"The rules of a catalogue code should provide for all the added entries of a document to be consistent with its main entry. Also the main entries of the document should be consistent with one another in certain essentials such as choice of heading".

The catalogue code should not prescribe different rules for different books by reason of origin, publication and so forth. It does not insist uniformity with regard to details and compulsory cataloguing of all books.

8. Canon of Purity

"The rules of a catalogue code should not make one type of entry serve the purpose of another." Some of the codes earlier were prescribing subject heading in the place of author heading for the main entry in several of its rules for corporate authorship.

9. Canon of Recall Value

The universe of knowledge is dynamic and increasing. Professional organizations are also progressing in number contributing to the increase in the universe of knowledge through research and publication. Besides the innumerable and complex names of personal authors, the general readers as well as specialists have to cope with the increasing number of corporate bodies. With the increase in the number of institutions in each specific field of study, the names are also turning out increasingly multi-worded with number of permutations and combination of terms indicative of exact subject, geographical area, nature of organization and others. It is psychologically impossible for even a specialist in the field to recall or remember the names of these corporate bodies exactly in the order they occur on the title page of documents or in citation. Human memory cannot keep pace with the growing complexity in the names and number of corporate bodies.

In the context of this increase in corporate authorship and limitations of memory of readers the solution seems to rest with the catalogue. If the catalogue can provide a clue to the reader, he will be able to recall or call-back to the memory and recognize the entity about which he had only a vague memory or may have forgotten.

6.3.4 Principles

NOTES

1. Law of Symmetry

"The principle that of two entities in situations which admit of being regarded as symmetrical counterparts of each other, if one of the entities context, the other entry or situation should also be given a corresponding weight".

In case of a joint author's work, law of symmetry suggests that in the heading of the Main Entry, we are obliged to write the names of the two authors in the sequence in which they occur on the title pages. CCC prescribed the rules at the directive of law of symmetry in case of joint authors. No other code made such a provision.

2. Principle of Local Variation

This principle states that an international catalogue code should mark out the factors to be left in each national catalogue code. A national catalogue code should mark out the factors to be left to the care of each linguistic catalogue code in a multilingual country such as India. A national catalogue code or a linguistic catalogue code as the case may be should mark out the factors to be left to the care of the local catalogue codes in each individual library. The catalogue codes in each hierarchical line should be consistent with one another without any mutual contradiction; and each lower link in each hierarchical line should be a supplement to all the upper links taken together.

3. Principles of Osmosis

The principle state that when a change in the catalogue code or in the scheme of classification becomes necessary in difference to the canon of context on and after a chosen date, all the new accessions be catalogued and classified according to the new catalogue code and the new scheme of classification; just those of the old collection as are known to be in much use be recalculated and reclassified with an additional temporary staff, if necessary during the first few months; the new accessions and the recatalogued and reclassified books be kept in a new collection and similarly their catalogue cards too kept in a new collection; the rest of the old collection be kept as old collection and similarly their catalogue cards be kept as old collection; Reader's attention be invited by the Reference Librarian to the existence of the two collections; and if any book is taken out by a reader form the old collection, on its return by him, it be recatalogued and absorbed in the new collection and similarly with its catalogue cards.

4. Law of Parsimony

"Between two or more possible alternative rules bearing on a particular phenomenon, the one leading to overall economy of manpower, materials, money and time considered together with proper weightage is to be preferred."

This principle though brought in vogue by Ranganathan, it is in practice in many disciplines and suggested by various catalogue codes over a period of time. For example, the distinction made in RDC between 'full' and 'short' style in catalogue is a contribution of law of parsimony.

NOTES

6.4 LIBRARY CATALOGUE: PURPOSE, FUNCTIONS AND FORMS

The purpose of a library catalogue is to help the library user in identifying a document and also help in selecting a work or works expeditiously and exactly as per his or her requirements. The library catalogue helps the librarians to achieve these purposes by satisfying various approaches of a reader; giving bibliographical details for further assistance in the selection of exact documents; and bringing together other relevant information by analytical entries, cross references and so forth, to sharpen the search and leading to the exact location of all relevant documents in the library.

Functions of a Library Catalogue

According to Dr Ranganathan, the function of the catalogue 'is to help the explosion of resources of the library in conformity with the laws of library science.' They are summarized by the statement that a library catalogue should be so designed as to:

(i) Disclose to every reader his or her document.

(ii) Secure for every document its readers.

(iii) Save the time of the reader, and for this purpose;

(iv) Save the time of the staff.

Forms of Catalogue

Let us study the various forms of library catalogue and their merits and demerits.

(i) Printed Book Catalogue

A printed book catalogue is that in which entries are made in a conventional page form and is bound into volume or volumes like books. It used to be the best and cheapest from of catalogue. Its use has long been abandoned in the libraries of Europe and America. It has been replaced by card catalogue and has long been abandoned in the libraries of Europe and America. Examples of a few conventional book catalogues include National Library of India, the British Museum, Author Catalogues London, Glasgow and Liverpool Catalogues, the catalogue of books represented by the Library of Congress and others. In US, the first Harvard catalogue in book form was published in 1723. The Yale Book catalogue was first published in 1745.

Advantage

It is the easiest form of catalogue and is available in multiple copies. A printed page of entries can be scanned with greater speed and less error than any other

arrangement. It occupies less space than card catalogues. It can be split into sections according to subjects. The number of copies may be increased according to the demand of the users. The printed book catalogue is portable and can be consulted in any part of the library. It is especially suitable for special collection.

Printed book catalogues of national libraries or large special libraries carry immense value as bibliographical tools and cataloguing aids.

Disadvantages

It is highly expensive to produce by conventional methods and get out of date immediately after publication. Insertion of new entries, withdrawal, correction or deletion is not possible, although this can be handled by way of issuing supplements. The recent additions are written in the interleaved blank page. It cannot exactly reflect the book-stock position because of periodic losses, pilferage and withdrawal of books in the library.

(ii) Sheaf Catalogue

A sheaf catalogue is similar to printed book catalogue in which slips of paper are put into a loose leaf binder and is bound by some mechanical device into a sheaf or volume. The present day sheaf catalogue consists of slips held together in specially produced loose-sheaf binders. The size of slips being 7-3/4 by 4 inches. Each binder holds approximately 500-650 slips. They are notched at the left edge and protected by means of boards put at the front and back-called binder.

Advantages

It is flexible because addition and withdrawal of entries can be carried out easily. It is easier to handle and consult as it is in the form of an ordinary book. The sheaf catalogue can be removed from its stand and consulted in any part of the library. It occupies far less space than the card catalogue. It is cheap to produce. Duplicate entries can be made. The sheaf catalogue is very useful in small libraries where limited cataloguing is followed.

Disadvantages

Several disadvantages are also there. It is cumbersome to insert and withdraw entries in sheaf catalogue as the binders have to be unlocked and locked time and again. Slips are less durable than cards. The author's name/main entry which starts from the first indentation is not always easy to read due to the binding system. The user may not always replace the binder to the correct place on the shelves. It is prone to be misplaced anywhere in the library. It prevents any scheme cooperative cataloguing where unit cards are used for exchange of entries.

(iii) Card Catalogue

The most widely used type of catalogue in the world is the card catalogue. It was developed in its modern format in the latter part of the 19th century, but it was popularized at the global platform in the early part of the 20th century. The availability of printed cards from the Library of Congress began in 1901. It was a

major factor that made the card catalogue well established in the US, Europe and elsewhere. The availability of printed cards with high standards of cataloguing from other commercial agencies also added more popularity to card catalogue.

NOTES

The standard size of the card measures 7.5×12.5 centimetres (5×3 inches). The cards measuring 5×3 inches are considered as slightly bigger than the size measured in centimetres. The cards stand in a card-cabinet drawer about half a centimetre form the bottom of the card. The thickness of cards approximate 0.025 cm. One drawer can accommodate around 1000 cards.

Advantages

The card catalogue has certain inherent qualities which are the main factors of its popularity. They are enumerated as follows:

(1) Flexibility

(a) Cards can be arranged in any way suitable to a library, alphabetically, numerically or by call numbers.

(b) The catalogue can be in dictionary of divided format.

(c) Can be updated by adding or removing card with ease.

(d) Drawers can be removed or replaced without any problem.

(2) Ease of Use

(a) It is relatively easy to use if the user reads only instructions.

(b) Guide cards, references and consistency in the forms of author's names and subject headings make the card catalogue an efficient tool for the users.

(c) Printed or typed cards are easy to read.

(3) Cost of Maintenance

(a) Updating the card catalogue is highly cheap as compared to other formats.

(b) Printed and computer-produced cards are easily available. In house-production is also inexpensive.

(c) Reproduction of cards with any method is relatively cheap.

(d) Maintenance is far less cumbersome. It is easy to add or remove cards from the catalogue.

Disadvantages

Many criticisms are raised against the card catalogue although its superiority over others is still unchallenged. Some notable criticisms are as follows:

(a) It can be consulted only at the place where it is located in the library. It is not portable like book or sheaf catalogue.

(b) At the time of consulting the catalogue single person monopolizes a considerable number of drawers leaving others to await, while a book catalogue or computer terminal display can show numerous entries.

(c) The growing card catalogue of a modern library presents serious space problems. The growth in size also brings in many complex problems making the catalogue administratively unmanageable.

(d) With the passage of time, inconsistency in names and subjects headings appears.

(e) Revision and/or use of different cataloguing rules and subjects headings over a period of time disturbs and impairs consistency. It creates chaos.

(f) This catalogue is relatively expensive piece of equipment for smaller libraries to purchase.

(g) More often cards are damaged, torn or defaced by the users.

(h) The user has to copy all information by hand while a computer terminal display can give print-out of the desired information.

(iv) Guard Book Catalogue

In a guard book catalogue entries are typed on large sheets of paper and bound together by mechanical means. The second method is one in which slips of entries are mounted in an appropriate place by pasting only one end of the slip. Spaces are left for additions. When no further addition in the current position on a page is possible, the entries are lifted and redistributed over two or more pages. Extra leaves may be mounted on guards. When a volume becomes congested, it is broken-up into two or more volumes.

(v) Horizontal Card Index

In this system the card lies flat. Each card projects a little in front of the one following. The cards lie in shallow drawers of about half an inch height. The full entry is typed on the card in the ordinary way and on the projecting piece only details necessary for the recognition of an item are recorded. To consult, the card is to be raised to vertical position. This index is mostly used in the periodicals department of a library. Insertion of new cards will be somewhat inconvenient.

(vi) Computer-Produced Book Catalogue

Beginning in the 1960s, a new type of book catalogue appeared. It was based on the use of computer. These computer-produced catalogues vary greatly in format, typography, extent of bibliographical detail and method of updation. The output may be in the form of line printer output, or may be computer typeset and presented in a form similar to printed book or index.

(vii) Microform Catalogue

The microform catalogue contains bibliographic records in micro images and requires the use of microform reader for viewing.

Microform catalogues became popular with the development of Computer-Output Microform (COM). These are various media for producing microform

NOTES

catalogue such as microfilm (continuous negative) micro card (positive) and microfiche (negative). This format has the advantage of economy in duplication. It is cheaper to duplicate than a book catalogue.

A microform catalogue may be produced by photographing book catalogues. But now it is produced directly from machine-readable records. The method is known as Computer-Output Microform (COM) as stated above. The COM method converts the digital information contained on the computer-generated magnetic tape into print displayed on microform.

(viii) Microfilm or Microfiche

Microfilm or Microfiche are commonly used for this purpose. Microfilm may be on a single reel, but more usually it is housed in a cassette containing two reels so that the film can be wounded backward and forwards within its container. Microfiche is a transparent card-type format. Microfiche has the advantage of direct access to a particular frame whereas microfilm requires a 'serial' search through the film to reach a required entry point.

Microfiche are generally produced with eye-readable dictionary captions across the top of each card. This makes fairly simple to locate the correct fiche. Also colour coded captioned fiche can be used to distinguish segments of a divided catalogue or supplements to catalogue. Microfiche, therefore, prove more useful for large library catalogue.

(ix) Machine-Readable Catalogue (MARC)

A machine-readable format is that which permits input and storage (on disc) for manipulation in a computer. Access to computer may be online or offline. Offline contact concerns operation without continuous or instant continuous communication with the computer. Data is processed in 'batches' which limits utility and flexibility.

Online systems are linked directly with the computer which can be used immediately for processing and searching. Results are displayed on a screen or visual display unit and may also be output to disc or printed in hard copy.

(x) Online Catalogue

An online catalogue is an organized, machine-readable accumulation of bibliographic records which are maintained on disks or other direct-access computer storage media for retrieval by library users and staff members working at interactive terminals or appropriately configured microcomputer work stations. In addition to saving space and automating file maintenance, online catalogues permit remote access by authorized persons equipped with compatible terminals, and they can support information retrieval operations-such as keyword searching of titles and series names-which are not conveniently possible with card or book form catalogues.

NOTES

(xi) CD-ROM Catalogue

The MARC format has been CD-ROM (Compact Disc Read Only Memory). CD-ROMs are optical discs which are written and read by a laser beam. Data is impressed on the surface as a series of pits of a variable length and the discs can store vast amounts of data in digital form.

The CD-ROM catalogue is used in a very similar way to online access and may provide excellent search facilities but it is an offline format, and like microform, is out of date as soon as it is produced. One great advantage of the CD-ROM is its transportability, a complete catalogue can easily be sent by post.

(xii) Author Catalogue

An author catalogue mainly consists of authors' names in the headings arranged alphabetically. But the entries in this catalogue usually include those for editors, translators. It also includes title entries for works such as serials and anonymous works.

(xiii) Name Catalogue

It is a "compound" catalogue or a mixed form of catalogue. A combined author catalogue and a subject catalogue in which the subject entries are limited to personal and corporate names, for example, for lives of individuals, history of corporate bodies and so forth. Name catalogue is a variation of the Author Catalogue and in it, author's name, name-title and name-subject entries are arranged in one alphabetical sequence. It will contain entries for works of an author and books written about him. It also contains entries for corporate bodies as 'author' and as subjects' as well as for name-series. A place name may also appear in the name catalogue only

(xiv) Title Catalogue

A title catalogue contains entries of books under their titles arranged alphabetically. A word or words of the title of a book are used to form entry. As it is restricted to titles of books only, its use is very much restricted from any other angle. The best substitute for this catalogue emerged in the form of author-title catalogue which is limited to author, distinctive and selected titles, and series entries with reference to the accepted form of author's name from that not used.

(xv) Alphabetical Subject Catalogue

An alphabetical subject catalogue attempts to bring together all books on one subject at one place. In this catalogue, entry is made under the name of the specific subject of a book. These entries are then arranged in alphabetical order. The basic principle of entry in an alphabetical subject catalogue is to enter a work under the specific or the narrowest form that will represent its subject, and not under the heading of a class which includes that subject. For example, a book on

birds will be listed under the headings BIRDS. A book on 'Butterflies' will be listed under BUTTERFLIES and not under ZOOLOGY or MOTHS.

(xvi) Dictionary Catalogue

NOTES

A dictionary catalogue is that in which all the entries, i.e., author, title, subject, added analytical series reference are filled together in one alphabetical order.

A dictionary catalogue is, therefore, of a mixed variety--a combination of the author-title catalogue and the alphabetical subject catalogue. It is a combination of two distinct and different approaches:

(i) The author or the title approach for the reader who knows the books or the author he wants;

(ii) The subject approach for the reader who does not know the book he wants for the material on some definite subject.

(xvii) Classified Catalogue

A classified catalogue is that in which subject entries are arranged according to some scheme of classification. The entries made under the class symbol (notations) represent the subject of a book in the classification scheme chosen. The subject entries arrangement follows the order of classification schemes used in a particular library. The success of the classified catalogue depends upon the viability of the classification scheme in use.

(xviii) Alphabetical Classified Catalogue

Alphabetical classed catalogue is that in which entries under broad subject headings are arranged in alphabetical order but each broad heading is subdivided into more specific subject divisions which are also alphabetically arranged.

6.5 LIBRARY CATALOGUING CODES: CCC AND AACR-II

Let us study the library cataloguing codes.

1. Classified Catalogue Code (CCC)

Classified Catalogue Code (CCC) is a unique and significant work and contribution of Dr Ranganathan in the field of cataloguing. The Classified Catalogue Code, which is very popular in its abbreviated form as CCC, was first published in 1934. Although it is an Indian contribution even then effort has been made for bringing it at the international level. It is the first code complete in every respect for a classified catalogue. The subject approach of the users has been recognized as the dominant one in this code. The code had been developed on a functional basis and the foundation of the code is based on the normative principles and the canons of cataloguing which Ranganathan evolved.

Features of Classified Catalogue Code (CCC)

NOTES

(i) **Complete Catalogue Code:** CCC in all respect is a complete code for cataloguing the books and other reading material.

(ii) **One Man Effort:** CCC is the unique contribution of the hard work and devotion of Dr Ranganathan.

(iii) **Rules for Classified Catalogue:** In this code, mainly the rules for preparation of classified catalogue are given only, which is based on the class numbers.

(iv) **Rules for Dictionary Catalogue:** Rules also have been provided for preparing dictionary catalogue in its first edition which was published named as Classified Catalogue Code with additional rules for Dictionary catalogue.

(v) **Based on Canons and Principles:** CCC is altogether a distinct cataloguing code based on canons and principles evolved by Ranganathan. Hence, the foundation of the code is based on the normative principles and canons of cataloguing.

(vi) **Objectives:** The main aim of constructing this code was to satisfy the subject approach of the readers coming to the library. Therefore, it was originally prepared for subject cataloguing, but the rules of dictionary catalogue are also provided in it by Ranganathan.

(vii) **Special Rules:** There is special provision of rules for compilation of union catalogues, periodical publications, national bibliographies, indexing and abstracting periodicals also.

(viii) **Use of Chain Procedure:** The chain procedure is the unique device in CCC which is the most important contribution of Dr Ranganathan for the art of cataloguing. It is a mechanical device to derive the subject headings from class number either for class index or for subject headings to be used for a dictionary catalogue.

(ix) **Language of the Library:** Keeping in view the language of the library this code is constructed. The language of the library is that in which the number of books is more and is called the first language and the second number language is called the favoured script.

(x) **Economical:** The economy is the main feature of this code. It does not allow the use of imprint and collation in the catalogue entry which is considered to be a part and facet of an entry for identification of the documents. The book number constructed in accordance with Colon Classification of Dr Ranganathan indicates the year of publication of the document, an additional information to the title statement of the entry in CCC is the edition of the books.

(xi) **Symbiosis:** CCC has established a symbiosis of classification and cataloguing.

NOTES

(xii) Free from Language Problem: CCC is free from the restriction of language unlike the other codes in spite of their non-local nature. It has achieved this by taking into account the following basic concepts.

(a) Language of the library

(b) Scale of language

2. AACR-II

Before coming on to AACR-II, the general principles of AACR should be studied.

The general principles of AACR are the following:

(i) A book should be entered under its author or the principle author when one can be determined.

(ii) A work should be entered under its editor when there is no author or no principle author and the editor is primarily responsible for the existence of a book.

6.6 ZONE ANALYSIS

Knowledge is infinite, unlimited and eternal knowledge is published in various forms. It is necessary to arrange the published works of knowledge to make knowledge practically useful. This work should be done at the ideological, verbal, and notation levels.

At the notation level, the ideas are converted from the verbal form to the classification of language. This way, multifaceted knowledge is arranged in a straight line. It is, therefore, necessary that notation should have flexibility and expansibility. In his Colon Classification Scheme, Dr Ranganathan was able to achieve these two attributes by adopting the mixed notation. By adopting the mixed notation, he gave birth to a new ideology of zone analysis.

Zone analysis is a logical method of dividing the various orders of the universe of knowledge into the possible zones.

This idea struck the mind of Dr Ranganathan indirectly and not directly. At the time of devising his classification scheme, he had never thought about the possible zones available at the ideological level. To achieve the attribute of flexibility in the isolates of his scheme (CC) he thought of four zones and in the intervening time these four types of ideas existent in the universe of knowledge was presented by him at the notation level. According to the concept of zone analysis, Ranganathan is of the view that at the ideological level, there are four types of isolate ideas which represent four types of zones. These four types of ideas can be mainly divided into two main parts:

(i) Common Isolate Ideas: The isolate ideas which are related to various subjects.

(ii) Special Isolate Ideas: The isolate ideas which are related to any special class.

The aforesaid each part can be further divided into two parts, consequent to which the following four types of isolate ideas are built:

NOTES

1. Enumerated Common Isolates : ECI
2. Enumerated Special isolates : ESI
3. Devised Common Isolates : DCI
4. Devised Special Isolates : DSI

These can be exhibited with the help of the following diagram:

Isolate idea	
Common Isolate Enumerated common Isolates (ECI) Devised Common Isolates (DCI)	Special Isolate Enumerated Special Isolates (ESI) Devised Special Isolates (DSI)

The following four types of zones were formed under the above mentioned four types of isolate ideas, which will follow the below-mentioned order in any array:

(i) ECI

(ii) ESI

(iii) DCI

(iv) DSI

The above sequence satisfied the principles of helpful sequence because the enumerated isolates have been kept in one place and the devised isolates have been kept separately in one place.

ECIs are related to the approach material and generalia class, therefore, they should be kept before (ESI).

For determining the sequence of the devised isolates, it has been seen that the race sequence and the time sequence methods are used more than the subject sequence method, therefore, DCI has been given the last place.

CC scheme is based on the mixed notation.

Zone 1 begins with double zero (two zeros).

Zone 2 begins with single zero (one zeros).

Zone 3 begins without zero. The conventional main classes are mentioned under it.

NOTES

Provisions at the Notation Level:

Four types of numbers are used in CC. These four types of notations, represent the four types of zones at the notation level as follows:

Use of small Roman letters (abc...z) : Zone 1

Use of Indo-Arabic numerals (1,2,3...9) : Zone 2

Use of Roman capital letters (ABC...Z) : Zone 3

Use of numbers within brackets: Zone 4

Zero Zone:

Dr Ranganathan devised a new zone (Zero Zone) and created a capacity for 265 new isolates under Zone 2. 15 new sectors have been devised through them.

Zones in Main Classes

Zone-1 Generalia Main Class-z

Zone-2 Those main classes have been included under it, which can be accommodated under the conventional main classes namely:

1. U.K.
2. Lib.Sc.
3. Book Science
4. Journalism

Zone-3 Conventional main classes: A-Z.

Zone-4 Such main classes, which are related to the developed techniques of the modern time.

(;g) Criticism Technique

(p) Conference Techniques

(r) Adiminstration Report Techniques

(P) Communication Theory

(X) Management.

Zones of Classes in Second order Array

The four types of the zones explored under the main class z Generals are as follows:

Zone-1 za General bibliography

zk General periodicals

Zone-2 The classes have been devised by dividing the main class Z into geographical areas, namely: z44 Indology, z41 Sinology.

Zone-3 This zone is devised by dividing the main class Z generalia by the first letter of the name of any particular person (A person who is not related to any class).

zG = Gandhana

ZN = Nehruani

Zone-4 Such classes which can be related to any special subject also, apart from the general class.

z(Q3) Jainology.

z(Q7) Islamology.

NOTES

Zones in Personality Facet:

Only three zones are available under it, zone1, 2 and 3.

Zone-1 Approach material

Xa Bib. on Eco

Xm Journal of Eco.

Zone-2 Special isolates of the P facet of main class.

X4 Eco. of Transport

X5 Eco. of Commerce

Zone-3 Systems and Specials

Specials are formed by using the vacant number 9. System is formed by the time sequence method.

X9b Small Scale Industries

XM Co-operative Economics

Zone in Matter Facet

Dr Ranganathan is of the view that the matter facet has no use under the general classification, but in the intensive classification, it is very essential. For this, some of the matter isolates are used by putting them under the common class isolates. Its division into four zones at the notation level has not so far been possible and, therefore, the matter can be divided into two parts:

Property Attribute Common Isolates

Value Attributes Common Isolates

On the basis of the aforesaid, Ranganathan has advocated the use of zone2, 3 and 4:

Value CMI	Musical Quality	nr	NR
	Ethical Values;	r4	R4
Property CMI	Physical,	Chemical	Bio
	;c	;e	;g

NOTES

Zones in Energy Facet:

According to Ranganathan, only one array is possible in the energy facet, there is no chain. The division of zones is called common energy isolate:

Zone-1	2 : f Research in Lib. Sc.
	2 : f Cr. of Lib. Sc.
Zone-2	2 : 2 Org. of Libraries
	2 : 3 Functions of Librarian
	2 : 4 Co-operation of Librarian
Zone-3	2 : (Y) Sociological Study of Libraries
	2 : (Z) Library Legislation

Zones in Space Facet:

The use of Zone 2, 3 and 4:

In the conventional classification, it is sufficient to divide the world into continents, countries, and states, but under intensive classification, it is necessary to divide the world on the basis of other characteristics, namely, language, religion, social, and directional.

Zone 2	11 Eastern Hemisphere
	12 Southern hemisphere
Zone 3	19 B East
	19 M West
Zone 4 by (CD)	1 (Q7) Muslim Countries
	1 (W6) Democracies
	1 (Y : 3) Developed Countries
	1 : (Y : 41) Underdeveloped Countries

Two zones of (S2):

Zone 1	F Forest
	G7 Mountain
Zone 3 (orientation)	9 B East
	9 M West

Zones in Time Facet:

Zones 1 and 3	have been used in it also:
Zone 1	Featured Time Divisions
	C Day Time
	d Night

	n3 Summer
	n7 Winter
Zone 3 (orientation)	Public Time

These have been mentioned in the chapter 3 of CCC, where;

A	Geological time
B	BC time
C	
D	1-999 AD
E-YC	1000 AD Onwards

Inverted quotation reversed sign (‘) is used between Featured time and Pub. Time div.

Dr Ranganathan created an infinite flexibility in the Colon Classification Scheme by using mixed notation. The provision of zone analysis has made possible to systematize the ever dynamic world of knowledge.

6.7 SYSTEM AND SPECIAL PHASE ANALYSIS

Some of the areas of the universe of knowledge are such where some sort of traits and systems are in vogue among the traditional main classes which can be given the form of a separate class, and where plenty of material on the subjects from the bibliographic point of view is available. There is, therefore, sufficient basis for acquiring the status of a main subject, but the basic class can only be their basic subject.

Looking at medical science, we find that its object is to study various systems and points of view on the human health and treatment of diseases, and putting them into practice. This type of concept is in practice in the Colon Classification Scheme at the ‘idea plan’ level and ‘notational plan’ level. In the beginning, it was called ‘school of thoughts’, but this term was given the name of ‘system and special’, in 1952.

Under the medial science, various medical systems have been covered, namely, homeopathy, Unani, Ayurveda, Allopathy, natural medical science and others. The objective of all these systems is the one and the same, but the treatment carried out is different. There is, therefore, necessary requirement of special system for their classification. Some of the sub-divisions of a subject become special classes. Dr Ranganathan has recognized these two types of specialties and named it Amplified Facet. At the verbal level, these have been termed as System and Special. The system of thought from the point of view of one subject has been called Amplified Basic Class.

NOTES

NOTES

Special

The system of accomplishment of all the activities and processes from the speciality point of view in an area of any basic class, is called "Specials". According to Dr Ranganathan, "Explanation of any subject from any one point of view can be termed as Specific." Specials have been listed under various main classes in the Colon Classification Scheme:

(1) **Physics:**

C9A Specials

C9B1 Molecular Rays

C9 B2 Atom

C9 B3 Nuclear

(2) **Chemistry:**

E9A Specials

E9G Bio-chemistry

(3) **Biology:**

G9A Specials

G9B Embryo

G9C Child

G9D Adolescent

G9E Old Age

(4) **Medicine:**

L9A Specials

L9B Embryo

L9C Child

L9D Adolescent

L9E Old Age

L9F Female

L9H Tropical

L9T Aviation

L9V War

L9X Industrial

The jurisdiction of the aforesaid specials is limited to the minutest organs of that particular area only, and they have no relation with the specials of the other area, which implies that each special is related to a subject from some definite point of view. For example, a gynecologist has interest only in the various organs of females, their problems and diseases.

In the Colon Classification, Specials have been described with the help of 9A/9Z to provide distinction to a Special under any main class, number 9 is added to the notation of the main class followed by one of the capital letters of the English alphabet.

Main class facet sub rule has been provided for the subdivision of Specials:

Examples:

L	=	Medicine
L9F	=	Female
L9F3	=	Circulatory System of Female
L9F : 4	=	Disease of Female
L	=	Basic Class
9F	=	Specials
3	=	Personality : P
4	=	Energy : E

Systems:

System signifies a method of any academic technique or subject knowledge on the basis of special study or thought process, or any point of view expressed in a subject. The word 'system' applies to a subject which has been studies from various points of view. The number of systems will correspond to the number of points of view, and under each point of view, the complete area of the subject is considered, namely, allopathy under medical science, basic education system under education and capitalism under economics.

Under the Colon Classification Scheme, the list of systems is given under various main classes:

(1) **Physics:**

CA Systems

CK Gravitation Theory

CM9 Election Theory

CM96 Radio Theory

CN Relativity

(2) **Medicine:**

LA Systems

LB Ayurveda

LC Siddha

LD Unani

LL Homoeopathy

LM Naturopathy

(3) **Agriculture:**

JA Systems

JB Forestry

NOTES

Apart from this, lists of systems have been given under the main class psychology, education, history and economics. The systems have been mentioned with the help of the chronological device. The time of the origin of any system is its characteristic. For devising a system under any main class, therefore, the notation of time is added to the notation of the main class.

Example:

XM Co-operative

In it. X is the basic class of economics.

M represents the 19th century, which implies that the origin of cooperation dates back to sometime during the 19th century, therefore, the number of this system has been determined as XM.

The main class facet provides sub rule for the subdivision of the system.

Example:

X	=	Economics
XM	=	Co-operative
XM, 8(F182)	=	Co-operative Iron Industry
XM, 8(F182) : 8	=	Management in Co-operative Iron industry
X	=	Basic Class
M	=	System
8(F182)	=	Personality (P)
8	=	Energy

6.7.1 Postulates and Postulation Approaches

In arranging books on the shelves of a library, convenience requires that they should be arranged aloft a linear sequence. As books deal with subjects, it follows that the physical limitation enforcing a linear arrangement of books enforces also a linear arrangement of subject. But this creates problems since subjects belong to a dynamic, ever-growing, multi-dimensional, universe. In effect, it would mean that classification of subjects for arrangement in library amounts to mapping or transforming the system of points marked out in multidimensional space into a system of points along a line. That is, the multidimensional space should be mapped along one-dimensional space, a line for example.

Thus, in library classification, the problem is to choose what should be kept unvarying in the classification of subjects. The question then is as to which of the subjects can have its immediate neighbourhood relation kept unvarying in the

mapping, since an indefinitely large immediate neighbourhood relations are possible. Thus, mapping is an extremely matter.

Different schemes have provided different solutions to this problem. The problem of mapping has been solved by Ranganathan by means of certain guidelines. This, he called as postulational approach to library classification, in which a set of postulates (guidelines) can be for offering an operational methodology in a given field. While this type of postulational approach was adopted in mathematical studies and other subjects like philosophy, Ranganathan used the postulations approach very effectively in library and bibliographical classification. According to him, 'A postulate is a statement about which we cannot use either of the epithets right or wrong. We can only speak of a set of postulates as helpful or unhelpful. Thus, postulates are certain assumptions, which are helpful in carrying out the process of classification of documents.

NOTES

The postulational approach in library classification brings objectivity to the study and practice of this discipline. It puts the study and practice of library classification on a scientific basis. As a result of this approach, the discipline of classification has become both easy and interesting. In fact, Ranganathan calls practical classification based on postulates as "classification without tears". On the other hand, a classificationist who designs and develops schemes of classification should base his work on such an approach to avoid pitfalls. This approach also helps a classifier to avoid the hit-or-miss approach to classification. As a matter of fact, the postulates of this approach are helpful and useful for a comparison of the efficiency and. effectiveness of different schemes of classification.

Check Your Progress

1. List the canons of characteristics as devised by Dr Ranganathan.
2. Name the two cannons which constitute an integral aspect of the filiatory sequence.
3. Mention the canons which constitute an integral part of the canons of verbal plane.
4. What are the essential qualities of a good notation?
5. State one advantage of a printed book catalogue.
6. What is a classified catalogue?

6.8 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. The canons of characteristics as devised by Dr Ranganathan are the following:
   (i) Canon of Differentiation
   (ii) Canon of Relevance

NOTES

(iii) Canon of Ascertainability

(iv) Canon of Performance

2. The two cannons which constitute an integral aspect of the filiatory sequence are the following:
   (i) Canon of Subordinate Classes
   (ii) Canon of Coordinate Classes
3. The canons which constitute an integral part of the canons of verbal plane are the following:
   (i) Canon of Context
   (ii) Canon of Enumeration
   (iii) Canon of Currency
   (iv) Canon of Reticence
4. A good notation should have the following qualities of simplicity, brevity, synthesis, mnemonics and flexibility.
5. A printed page of entries can be scanned with greater speed and less error than any other arrangement.
6. A classified catalogue is that in which subject entries are arranged according to some scheme of classification.

6.9 SUMMARY

- Canon means a rule, regulation or law. It can also be defined as a principle, model, standard or criterion. Hence, various models, principles, test used for the working and efficiency of different schemes of classification are called Canons of classification.
- Different principles that recommend certain characteristics to be selected for the process of classification are called "Canons for characteristics". Dr Ranganathan has given the following four canons of characteristics.
  (i) Canon of Differentiation
  (ii) Canon of Relevance
  (iii) Canon of Ascertainability
  (iv) Canon of Performance
- An array is the sequence of the classes of a universe derived from it on the basis of single characteristic and arranged themselves according to their ranks.
- To arrange the classes of an array in a helpful order, or in other words, to implement the canon of helpful sequence, Ranganathan formulated certain

guidelines in the form of principles of helpful sequence. These principles are listed below:

(i) Principles of later in time
(ii) Principles of earlier in time
(iii) Principles of later in evolution
(iv) Principles of earlier in evolution
(v) Principles of spatial contiguity
(vi) Principles of increasing quantity
(vii) Principles of decreasing quantity
(viii) Principles of increasing complexity
(ix) Principles of decreasing complexity
(x) Principles of canonical sequence
(xi) Principles of decreasing literary warrant
(xii) Principles of increasing literary warrant
(xiii) Principles of alphabetical sequence

- The role of FID is most important in the field of research in library classification. The committee named FID/CA was constituted with the same objectives in 1946, but in 1962 its name was changed to FID/CR (Classification Research).
- Generally speaking, a library catalogue is a list of books and other materials in a particular library, arranged according to a definite plan or determined order and containing specified items of bibliographical information for the purpose of identification and location of the materials catalogued.
- The purpose of a library catalogue is to help the library user in identifying a document and also help in selecting a work or works expeditiously and exactly as per his or her requirements.
- A printed book catalogue is that in which entries are made in a conventional page form and is bound into volume or volumes like books. It used to be the best and cheapest from of catalogue.
- A sheaf catalogue is similar to printed book catalogue in which slips of paper are put into a loose leaf binder and is bound by some mechanical device into a sheaf or volume.
- The most widely used type of catalogue in the world is the card catalogue. It was developed in its modern format in the latter part of the 19th century, but it was popularized at the global platform in the early part of the 20th century.
- Beginning in the 1960s, a new type of book catalogue appeared. It was based on the use of computer. These computer-produced catalogues vary

NOTES

NOTES

greatly in format, typography, extent of bibliographical detail and method of updation.

- Microfilm or Microfiche are commonly used for this purpose. Microfilm may be on a single reel, but more usually it is housed in a cassette containing two reels so that the film can be wounded backward and forwards within its container. Microfiche is a transparent card-type format.
- The MARC format has been CD-ROM (Compact Disc Read Only Memory). CD-ROMs are optical discs which are written and read by a laser beam. Data is impressed on the surface as a series of pits of a variable length and the discs can store vast amounts of data in digital form.
- Classified Catalogue Code (CCC) is a unique and significant work and contribution of Dr Ranganathan in the field of cataloguing. The Classified Catalogue Code, which is very popular in its abbreviated form as CCC, was first published in 1934.
- Knowledge is infinite, unlimited and eternal knowledge is published in various forms. It is necessary to arrange the published works of knowledge to make knowledge practically useful. This work should be done at the ideological, verbal, and notation levels.
- Dr Ranganathan is of the view that the matter facet has no use under the general classification, but in the intensive classification, it is very essential.
- Some of the areas of the universe of knowledge are such where some sort of traits and systems are in vogue among the traditional main classes which can be given the form of a separate class, and where plenty of material on the subjects from the bibliographic point of view is available.

6.10 KEY WORDS

- **Canon:** It refers to a rule, regulation or law.
- **Postulate:** It refers to a statement accepted as true for the purposes of argument or scientific investigation.
- **Thesauri:** It is the plural form of the word thesaurus. It basically refers to a storehouse of words.

6.11 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions

1. Mention the recent developments in the field of classification in the present times.

2. Identify the new trends in the field of library classification.
3. What are the functions of a library catalogue?
4. Write a short note on the library cataloguing codes.
5. What is the significance of zone analysis?

NOTES

Long Answer Questions

1. Discuss the various canons of classification.
2. Critically analyse the contribution of international research groups in library classification.
3. Explain the forms of library catalogue.
4. Explain the concept of zone analysis with the help of examples.
5. Describe system and special phase analysis.

6.12 FURTHER READINGS

Parkhi, RS. 1960. *Library Classification: Evolution and Dynamic Theory*. Bombay: Asia Publishing House.

Raju A. 1991. *Universal Decimal Classification.* Madras: T.R. Publishers.

Ranganathan SR. 1963. *Colon Classification*. Sixth Edition. Bombay: Asia Publishing House.

Ranganathan, SR. 1965. *Prolegomena to Library Classification*, Second Edition. London: Library Association.

NOTES

UNIT 7 NOTATION AND CONSTRUCTION OF CLASSIFICATION NUMBER

Structure

7.0 INTRODUCTION

Notations are systems of written symbols that can be combined according to some set of syntactical rules to represent various meanings in a specialized domain. Familiar examples include mathematical or logical formulas using numbers, variables and operators; formulas denoting chemical compounds by the kind, number and bonds of their atoms; and successions of notes forming a musical score. Such systems can be understood as special languages, that is, languages for special purposes, and as artificial languages (Sammet and Tabory 1968). They are typically alternative to the expression of equivalent contents in words, which was more common in former literature; occasionally, words themselves may be used as in the "verbal notation" for music (Word Event 2011). Several more specialized domains, including knowledge organization, have also developed their own notations.

In this unit, you will study about the need, purpose, types and qualities of notation and the concept of construction of classification number.

7.1 OBJECTIVES

After going through this unit, you will be able to:

- Explain the need and purpose of notation
- Discuss the types and qualities of notation

- Identify the functions of notation
- Examine the concept of construction of classification number

7.2 NEED AND PURPOSE OF NOTATION

NOTES

Several specialized domains have also developed their own notations. For example, the Pfafstetter Coding System allows for ordering of river basins and their branches by a decimal positional notation (Verdin and Verdin 1999); the International Phonetic Alphabet allows for precise representation of phonemes and their sequences in any natural language; programming languages for computers use various symbols for instructions and variables. The Laban notation is used to represent successions of movements of the human body in physical activity or in dance; chess matches are recorded by an algebraic notation indicating pieces and coordinates in the game board; pace notes are recorded by special symbols in a notebook then read to rally drivers in order to anticipate the coming bends, junctions and optimal gears.

Bawden (2017) considers "the extent to which information representation and communication [of molecular structures by notation] has gone hand-in-hand with the development of concepts and theories in chemistry, so that it is difficult to tell where the one ends, and the other begins". He echoes Grolier (1991, 99-100) where he observed that "historians of science repeatedly assert that progress in such sciences as logics, mathematics and chemistry was largely conditioned by important innovations in notation (symbolization). The same judgment could be valid for classification".

In the context of modern knowledge organization, notations are systems of symbols that identify the concepts of a KOS (Vickery 1952-1959; Daily 1956; 1976,; Grolier 1956; Coates 1957; Dobrowolski 1962; Mills 1967; A.C. Foskett 1996). Bliss (1940) described notation as "a system of symbols for maintaining the structural order of a classification and for locating terms, or subjects, in the classification", and Ranganathan (1945) as "an artificial language of ordinal numbers for the specific purpose of mechanizing arrangement". Ranganathan also makes a clear distinction between:

- the *idea plane*, that is the concepts and relationships in a KOS,
- the *verbal plane*, that is their expression in terms of some natural language, and
- the *notational plane*,that is their translation into the symbols of some notation.

Along with the capacity to create ideas, came also the capacity to develop an articulate language as medium for communication. [...] But, language is more lethargic than idea. Homonyms and Synonyms, therefore, grow like weeds. Undertones and overtones grow in abundance. Therefore, attempts are continually

NOTES

in progress to make a language precise—at least among those creating ideas in a specific discipline. It is so at least for newly created ideas. Further, words are often replaced by symbols denoting precise meaning. When arrangement is found necessary, ordinal numbers are used as helpful symbols. A distinctive contribution of classification, as found and as being cultivated in the field of Library Science, is the Notational Plane. Uniqueness of the idea represented by an ordinal number and the total absence of homonyms and synonyms are the distinctive features of the notational plane, when compared to the verbal plane. (Ranganathan 1967)

Notation is typical of classification schemes, while in such verbal KOSs as subject heading lists *thesauri*, taxonomies and ontologies concepts are primarily identified on the verbal plane through controlled terms formed with one or more words. However, notations can sometimes be used as well to represent concepts that are also identified by terms, for example, as language-neutral identifiers in multilingual thesauri, or as record identifiers: for example, in Medical Subject Headings (MeSH) the term `retina` can also be represented by its notation `A09.371.729`, a subdivision of `A09.371` which represents the broader term `eye`.

Homonymy and synonymy can also be managed on the verbal plane (unlike the quote above appears to suggest) in thesauri; but terms representing concepts do not include information on their ordinal and hierarchical position in the structure of the system. Indeed, in verbal systems terms are usually presented in alphabetical order, which makes them easy to be searched only when the appropriate term is known in advance. On the other hand, as users do not always know an appropriate term by which their information need is expressed, a systematic arrangement according to some principle can also be useful to guide them across the collection of available documents. For some kinds of concepts, systematic arrangement is even required by common sense, as it would be inconvenient to list for example, Friday, Monday, Saturday, Sunday, Thursday, Tuesday, Wednesday, or divorce, engagement, marriage, separation in alphabetical order only.

In classification schemes, a systematic order is the preferred way of displaying concepts, while an alphabetical index (commonly known as the Relative Index in the Dewey Decimal Classification, DDC) is only an auxiliary tool for finding the place of a concept in the systematic schedules. In order to control the systematic sorting of items indexed by a classification scheme, some notation is required (Ranganathan 1967). This feature may even be seen as the most typical to distinguish classification schemes from such other KOS types as taxonomies (where concepts also form hierarchical trees, but sister branches are listed alphabetically) or thesauri (where concepts are primarily listed alphabetically and hierarchical trees can only be inferred through series or BT/NT relationships). Unlike one may believe at first sight, the most important function of notation is not to represent the corresponding concepts in a short form, but to record the appropriate sequence in which they are presented, both in the schedules and in any set of information resources. This makes the notational system adopted in a

KOS, with its peculiar properties, less trivial than the bare use of any set of abbreviations.

7.3 TYPES AND QUALITIES OF NOTATION

NOTES

Within a document, numerical notations such as those of the DDC or the Universal Decimal Classification (UDC) can usually be distinguished from bulk text as they consist (mostly) of numerals rather than letters. However, ambiguities may occur as numerals can also be used to represent quantities, document sections or other information. This is even more the case with notations that mainly use letters, such as that of Bliss Bibliographic Classification (BC).

To avoid ambiguity and express the nature of notation, then, this can be represented in a font different from the bulk text. In some card catalogues subject-related headings were written in red, a heritage of rubrication (from Latin *rubrum* "red") of emphasized parts of old manuscripts. In modern digital-based printing and visualization on screen, no standard use has spread yet. Easy options are italics or bold as opposed to regular font. We recommend use of a monospaced font (such as Courier), as commonly adopted for representing code in computer science literature and for rendering the content of the `<code>` HTML element. This choice expresses the fact that notation is a special technical language other than natural language which forms the bulk of a text. An example of this use follows:

The facet `mqvtn2` "whales, in *area*" is seen as both a subclass of `mqvtn` "whales" and a subclass of `2` "in *place*". Also notice that the facet name, "*area*", has been recorded here as an alternative label. An alternative approach for facets could be the use of `skos: collection` classes (Gnoli et al. 2011).

In controlled vocabularies the function of identifying concepts is played by controlled terms, so these can also be represented in a monospaced font. For the verbal captions that illustrate the meaning of a class notation, no standard use has spread either. To avoid ambiguity, these should also be distinguished from bulk text in some way. Vickery (1956) uses small capitals; brackets or quotation marks, as in the example above, are other easy options.

Notational bases

In principle, any set of written symbols may be adopted as a notation. A binary system, for example, may adopt only `0` and `1`, or a red dot and a blue dot, or and like in the *I Ching* classic Chinese text. However, only letters and numerals have conventional orders that are widely known, which has obvious advantages for the ordering function often played by notation.

As many important modern classifications have been developed in Western culture, Roman letters or Hindu-Arabic numerals are the most common choices. Additional symbols like punctuation marks are sometimes added, especially since

the development of UDC and → Colon Classification (CC), although their standard sequence is less obvious and needs to be defined explicitly by developers then learned by users.

NOTES

In general, exceedingly complex notational bases are considered to be a hindrance to users, as parodied in the character of Sariette, a family librarian from a tale by Anatole France (1914) who devised so complex shelf marks that they could only be understood by himself (Gnoli 2006).

Positional notation

DDC took its very name from the adoption of Hindu-Arabic numerals `0` to `9`. They make it a "decimal" system not just in the sense that classes are subdivided into arrays of ten subclasses; but especially, in the sense that the resulting numbers must be read and interpreted in the same way as decimal numbers, according to the *positional notation* used in mathematics (as opposed to *sign-value notation* like in Roman numerals) extended to the *radix fractions* that can follow the decimal point. That is, despite 123 is greater than 14, `0.123` precedes `0.14` because 2 precedes 4.

This practice opens the room for indefinite expansion of notation and of classification schedules themselves, as more characters specify more detailed *subdivisions* of a field of knowledge (Visintin 2005). Positionality allowing for indefinite expansion of subjects can be considered to be a major technical innovation in the history of bibliographic classification.

Every day, in libraries throughout the world, cataloguers perform a feat of dazzling intellectual audacity. They classify books and other materials. In other words, they reduce the infinite dimensions of knowledge to a straight line from `000` to `999` or `A` to `Z`. There is an old cartoon of a gamekeeper and a fisherman. The first says "You can't fish here" to which the fisherman replies "I *am* fishing here". Classification, the thing that cannot be done, is done all the time by librarians. The amazing thing is that it works—classification numbers, those dots on the straight line, enable library users to locate materials and groups of materials with great ease and are used more and more on online systems to provide sophisticated subject access (Gorman 1998).

The positional principle is usually adopted for notating the main classes of a scheme and their immediate subdivisions, although DDC requires that a class number has at least three digits, with the digit characteristic of every main class followed by `00` (e.g. `300` rather than just `3` for "social sciences") and the two digits of their hundred subdivisions followed by `0` (e.g. `380` rather than just `38` for "commerce"); however, this horror vacuity is only a graphic convention with no effect on the system structure, and has indeed been successfully abolished in UDC. If more than three degrees of subdivision are expressed, the first three digits are followed by a dot, then by further digits in any number according to the subject specificity:

NOTES

300 social sciences

380 commerce, communication, transportation

386 inland waterway & ferry transportation

386.4 canal transportation

386.40 [special subdivisions of canal transportation]

386.404 special subjects in canal transportation

386.4042 activities and services [in canal transportation]

386.40424 freight services [in canal transportation]

Such further digits used to be written in DDC by groups of three separated by a blank space for the sake of readability (`386.404 24`), but in the digital environment blank spaces tend to be abandoned (`386.40424`).

DDC was also an application of the principle of relative location, as shelf marks were now assigned to books themselves rather than to shelves. A book could now be assigned a shelf mark according to its subject, and keep it regardless of its material position in shelves and rooms. This makes it possible to interpolate shelf marks expressing more specific subjects, indefinite addition of new books by moving the adjacent books to the next shelf, or even move of a whole collection to a new place without changing its shelf marks. Class marks can also be detached from the shelving function, to denote the subject of a book in an abstract sense, be it used to define its position in a shelf or not, for example, in a catalogue or a bibliography. Significantly, this also means that the same class marks can be reused by several libraries (Green 2009). Unlike commonly believed, relative location was not invented by Dewey himself, but was common in German libraries during the 19th Century, for example, at the Ducal Library of Hessia-Darmstadt which used Andreas Schleiermacher's Bibliographisches System, also featuring common auxiliaries (Stevenson 1978).

As mentioned above, the notational base of DDC was also adopted by UDC, which was originally created as a special version of DDC. UDC additionally introduced punctuation marks to specify common auxiliaries such as places, time periods, languages, forms of the document and so forth. Thus, a pure notation of digits evolved into a mixed notation of digits and punctuation marks. While pure notations use only one kind of symbols, mixed ones use several of them, for example, both literals and numerals.

Apart from possible ambiguities in the filing order of punctuation marks, the notational base of DDC and UDC is regarded as optimal, because Hindu-Arabic numerals are more widely known across the world than Roman letters, which are exclusive of some alphabets. Indeed numerals are also adopted by the Korean Decimal Classification (KDC) and the Nippon Decimal Classification (NDC), which are derived from DDC, and the Library-Bibliographical Classification (LBC or BBK) changed its Cyrillic letters to numerals for the sake of internationalization

NOTES

(Sukiasyan 2017). UDC numeral notation is widely used as a common language in the libraries of many Eastern European countries, where national alphabetical subject headings would be less effective as the local languages are spoken by a relatively low number of users, making the development and maintenance of subject heading lists economically disadvantageous. A pure numeral notation representing a completely different ordering of knowledge is adopted in Dahlberg's Information Coding Classification (ICC) (Dahlberg 2008).

Number of sister classes in one array

While being a practical solution, the adoption of Hindu-Arabic numerals or the Roman alphabet also entails important effects on the structure of a classification scheme. Notations based on numerals or letters have different capacity (Mills 1967), so that systems may have up to 10 or 26 main classes, 100 or 676 subclasses and so forth, depending on their notational base. But after all, why should every concept be always subdivided into 10 or 26 specifications like in a Procrustean bed? Clearly, DDC main disciplinary classes are ten rather than eight or fifteen as an effect of the notational base, rather than for any intrinsic property of knowledge fields. This problem of "not following the path of nature, but adapting plants to author's own prescribed method" was noticed already by botanist John Ray (1627-1705) while commenting Robert Morison's classification of plants (Ray 1848, cited in Rossi 2000).

Notation should reflect order, not determine it. Bliss has said that it is "correlative and subsidiary". The systematic sequence of topics is the essence of library classification. Notation is only the mechanism which maintains that sequence; it should be considered only after the problems of sequence have been decided. (Mills 1967).

While developing classification schemes, editors try to mediate between practical requirements of notation and intrinsic requirements of subjects structure in various ways, for example, by not using all available symbols when a lesser number of subdivisions has to be expressed. Three technical devices have also been adopted in various systems to make a notational base better reflect knowledge structures: telescopization, centesimal notation and sectorizing digits.

Telescopic notation is the conscious squeezing of two degrees of subdivision into a single notational array, like in the following example (Bhattacharyya and Ranganathan 1978).

I1 Cryptogamia

I2 Thallophyta

I3 Bryophyta

I4 Pteridophyta

I5 Phanerogamia

I6 Gymnosperm

I7 Monocotyledon

I8 Dicotyledon

or in DDC:

722-724	architecture schools and styles
722	architecture from origins to 300 AD
723	architecture 300 to 1499 AD
724	architecture after 1400
725-728	specific structure types
725	public structures
726	building for religious purposes
727	buildings for education and research
728	residential and related buildings

NOTES

On the other side, a class may occasionally need to be divided into more than 10 or 26 subclasses. A common case is a list of the twelve months in a year represented in a numeral notation: 1 "January", 2 "February", 8 "August", "September".

One solution is centesimal notation, that is the use of two numerals instead of a single one to identify sister classes belonging to one and the same array, so that the base is expanded from ten to one hundred (or, in principle, to one thousand and so forth, or to 26^2, 26^3); however, this hampers expressivity and makes notation longer. It is adopted in LBC:

5	health care, medical sciences
53.0/57.8	clinical medicine
...	
55.5	rheumatology
55.6	oncology
55.8	dermatovenerology
56.1	neuropathology, neurosurgery, psychiatry
56.6	stomatology
56.7	ophthalmology
56.8	otorhinolaryngology
56.9	urology
57.0	medical sexology
57.1	gynecology
57.3	pediatrics
...	

NOTES

And occasionally in other systems, for such arrays consisting of many subclasses as plant families in UDC:

582.7/8 Rosidae

...

582.73 Fabales

582.74 Sapindales

582.75 Geraniales

582.77 Myrtales

582.79 Apiales

582.82 Vitales

To deal with such problems, Ranganathan also defined the practice of sectorizing digits or empty digits, consisting of keeping the first and/or last digit of a notational base for expansion of the preceding notation (Ranganathan 1967, 312-313, cross references omitted):

Another method of satisfying the Canon [of extrapolation in array] is to postulate the first and the last digits to be empty—for use as sectorizing digits. This method will admit of extrapolation at the beginning and at the end respectively of the array.

In DC and UDC, the digit 0 and the digit 9—the first and the last digits of the pure base of Indo-Arabic numerals—are used as sectorizing digits in some arrays. [...]

CC uses a mixed base. Each species of digits forms a Zone in an Array. There is a sectorizing digit for each zone—z for Roman smalls, 9 for Indo-Arabic numerals, and Z for Roman capitals. Thus, it provides for any number of extrapolations at the end of each zone of an array. Further, extrapolation at the end is also possible by using packet notation. This amounts to extrapolating a whole zone at the end. [...]

Example in Zone (Z—1)

R6 Indian philosophy

R68 Dvaita philosophy (Dualism)

R691 Charvaka philosophy (Materialism)

While empty digits expand an array at its end, emptying digits allow for "interpolation of a new number between any two existing class numbers or isolate numbers" (Ranganathan 1967). This can be observed even in CC main classes, where main class KX "animal husbandry" has been interpolated between K "zoology" and L "medicine". A similar device has been proposed by Farradane (1952), consisting in expanding notation by introducing a different kind of symbol in the same array, for example, J, K, K1, K2, L, M..., just like Latin terms bister and others, are sometimes added to a number to interpolate further items in a list. Of course this makes notation less consistent and elegant.

While the exact number of symbols available for subclasses depends on the historical accidents of writing systems, the general fact that subclasses are associated to one or few tens of symbols may have natural bases. Indeed, all humans tend to group items into sets of manageable size for cognitive and practical purposes. The very fact that we categorize phenomena by a finite number of words, grouping them into classes instead of using a different symbol for every individual phenomenon, is a basic cognitive function. Miller (1956) famously identified "the magical number seven, plus or minus two" as the average number of items that can be processed by working memory.

7.4 FUNCTIONS OF NOTATION

Notations usually perform several functions at one and the same time. These are sometimes described as the "qualities" of a good notation (Kervégant 1962). In this section, the different functions are discussed separately, starting with the most fundamental ones.

1. Concept identification

Using a notation means to identify a concept within a KOS in a precise, concise way, independently from the vocabulary of any natural language. Indeed, as Ranganathan has suggested, "uniqueness of the idea represented by an ordinal number and the total absence of homonyms and synonyms are the distinctive features of the notational plane".

The notation for a concept usually is shorter, although more cryptic, than its formulation in words: this makes notation useful for representing the concept in contexts where a limited space is available, like the spine of a book. Brevity indeed is often a desired quality in notation. Vickery (1956; 1957) developed sophisticated calculations to estimate the average length of different types of notations, concluding that the briefest notations should be purely ordinal rather than expressive, should be retroactive unless the numbers of concepts per facet exceeds a certain limit, and should have distinctive symbols for main classes. However, in the contemporary digital context, expressivity has become more important than brevity.

2. Syntax

As notation can be composed of several parts, syntactical issues emerge. They are especially interesting with expressive notations, which can be exploited to manipulate concepts in automatic ways.

When combining two concepts, the second concept is usually interpreted as a specification of the first one. For example, philosophy of science can be expressed in UDC as either `5:1`, literally meaning science in some relation with (for example, treated in the perspective of) philosophy, or as `1:5`, meaning philosophy in some relation with (for example, dealing with) science. The choice

NOTES

has effects on the arrangement of concepts, as documents classed under the former combination will be filed together with other documents on science, but documents classed under the latter will be filed together with documents on philosophy. Therefore, choice should depend on which aspect is prior in the document itself, although local preferences may also affect it. UDC also provides a `::` symbol to specify that the order of the combination is relevant and cannot be inverted. Similar combinations are possible in CC: `Z(Q7)` "Islamic law", `Z&gQ7` "law influenced by Islamic religion". The first component of such combinations has been described in alphabetical subject indexing as the base theme of the document, while further connected components can be particular themes (Cheti 1996); Gnoli (2018) applies these notions to classification and its notation.

In faceted systems, notation for the facets should usually be expressed according to the facet formula of the class, following a standard citation order (Wali and Koul 1972). In CC this famously is "PMEST", that is personality facets should be cited first, followed by matter facets, then energy facets, space facets and time facets. As mentioned, notation should be devised in such a way that, in the schedules, the inverted order will appear, that is, classes specified by a time facet only should be listed before these with a space facet, then those with an energy facet and so forth.

While revising UDC class `2` for religion, Vanda Broughton has identified a notational "Genesis problem". This deals with concepts that are subdivisions of a faceted concept, like the book of *Genesis* should be a subdivision of the *Bible* in Judaism and other religions. UDC notation allows to express the concept *Bible* as a faceted combination `26-23` "Judaism, sacred books". Now, notation for "Genesis" should be a subdivision of the whole faceted compound `26-23`, rather than a subdivision of `-23` sacred books in general, so that just adding a digit after `-23` would be inappropriate; UDC editors agreed that the system, like other known classifications, lacks a notational symbol to express this, and that one could possibly be introduced to give e.g. `26-23,11` "Genesis".

Very complex combinations of concepts in synthetic notations may produce ambiguities in their interpretation, of the kind *a:(b:c)* vs. *(a:b):c*. To deal with this, some systems may use punctuation marks to properly group components of synthesized subjects. Clearly these punctuation marks have to be different from all other components of the notation; for example, UDC uses square brackets for grouping, which are different from parentheses used for common auxiliaries of form, place and ethnic group. The effect of such punctuation marks on the proper sorting of class marks has to be considered in practical applications.

Conclusion

Notation is a fundamental component of classification systems, and sometimes an auxiliary component of other KOS types. Its main function is mechanical control of concept ordering. Such ordering has important cognitive consequences for users,

even in the digital media. Additionally, expressive notations can allow control, both mechanical and digital (querying, extraction, sorting), of individual structural components of a classification system.

NOTES

To these purposes, a notation should be devised in such a way to respect the principle of general before specific, both within structural components and between them. In general, class spans and anteriorizing common isolates should precede simple classes; phase relationships should precede facets, and these in turn should precede subclasses; locally favoured classes should precede standard classes.

In modern digital applications, notation requires special database fields, scripts and interface design, in order to produce the optimal sequence of its structural elements for effective browsing of knowledge items arranged in systematic order.

7.5 BUILDING CLASSIFICATION NUMBERS

Using the Dewey Decimal Classification System is not a difficult task, but it does take some careful attention to detail and careful reading of notes to determine the correct notation for an item being classified. Many times library staff may become confused about the use of the DDC because they do not carefully read and follow the instructions under many of the listings in the schedules.

When using the DDC, it is important to think in terms of significant digits. When we think of a Dewey classification number we think of three digits, perhaps followed by a decimal point and further digits. This is the end result of using the schedules, but in creating a number it is helpful to string together all of the necessary numbers, and then place the decimal point as the final step in the process. This is particularly true when using the tables to add specific details to the notations from the schedules.

7.5.1 Index to Schedules

There are basically three different ways that notations can be created in the DDC. We will look at those three ways, with many examples, to show how the DDC is designed to work for the cataloguer.

The first way that notations can be created is by looking up a subject in the index and finding a complete notation in the schedules. Here are some examples of that process.

NOTES

If we need to classify a work about CARPENTRY, we begin by looking up "carpentry" in the index. It can be found on page 681 of the 13th Abridged Edition of Dewey published in 1997.

As you can see, this entry in the index leads us to the notation of 694 for CARPENTRY.

It is important to remember that the number given in the index is the classification number, not the page number in the schedules on which the subject can be found. When looking up a notation in the DDC, the numbers at the top corners of each page are guide numbers designed to show the user what section of the schedules he or she is looking in. Page numbers are listed at the bottoms of the pages.

In addition to classification numbers, the index may refer the cataloguer to a table which might also be relevant to the subject. Such a reference will begin with the letter "T," followed by the number of the table and then the relevant number in the table. We have seen this earlier when we looked up Borneo in the index. Another example can be found on page 21 of the Abridged Edition under the entry for England. Please look up that entry now.

In this example, the 942 is a classification number for the history of England and Wales. The T2-42 shows that a geographical subdivision for England appears in Table 2. Thus, the geographic subdivision -42 can be used on notations for other subjects. For example, a book on the birds of England would be classified 598 for birds, with the addition of .09 as the standard subdivision for geographical treatment, and the 42 from Table 2 to indicate England. This would build the number:

598.0942

Check Your Progress

1. What is the *Bliss bibliographic classification* (BC)?
2. What is positional notation?

7.6 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

NOTES

1. The *Bliss bibliographic classification* (BC) is a library *classification* system that was created by Henry E. *Bliss* (1870–1955) and published in four volumes between 1940 and 1953.
2. Positional notation is a system of expressing numbers in which the digits are arranged in succession, the *position* of each digit has a place value, and the number is equal to the sum of the products of each digit by its place value.

7.7 SUMMARY

- Notations are systems of written symbols that can be combined according to some set of syntactical rules to represent various meanings in a specialized domain.
- The Laban notation is used to represent successions of movements of the human body in physical activity or in dance; chess matches are recorded by an algebraic notation indicating pieces and coordinates in the game board; pace notes are recorded by special symbols in a notebook then read to rally drivers in order to anticipate the coming bends, junctions and optimal gears.
- Notation is typical of classification schemes, while in such verbal KOSs as subject heading lists *thesauri*, taxonomies and ontologies concepts are primarily identified on the verbal plane through controlled terms formed with one or more words.
- Homonymy and synonymy can also be managed on the verbal plane (unlike the quote above appears to suggest) in thesauri; but terms representing concepts do not include information on their ordinal and hierarchical position in the structure of the system.
- Within a document, numerical notations such as those of the DDC or the Universal Decimal Classification (UDC) can usually be distinguished from bulk text as they consist (mostly) of numerals rather than letters.
- In controlled vocabularies the function of identifying concepts is played by controlled terms, so these can also be represented in a monospaced font.
- DDC took its very name from the adoption of Hindu-Arabic numerals `0` to `9`.
- DDC was also an application of the principle of relative location, as shelf marks were now assigned to books themselves rather than to shelves. A book could now be assigned a shelf mark according to its subject, and keep it regardless of its material position in shelves and rooms.

- Using a notation means to identify a concept within a KOS in a precise, concise way, independently from the vocabulary of any natural language.
- As notation can be composed of several parts, syntactical issues emerge. They are especially interesting with expressive notations, which can be exploited to manipulate concepts in automatic ways.
- Notation is a fundamental component of classification systems, and sometimes an auxiliary component of other KOS types. Its main function is mechanical control of concept ordering.
- Notation is a fundamental component of classification systems, and sometimes an auxiliary component of other KOS types. Its main function is mechanical control of concept ordering.

7.8 KEY WORDS

- **Retroactive:** It refers to something happening now that affects the past.
- **Cognitive:** It means relating to the mental process involved in knowing, learning, and understanding things.

7.9 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions

1. What is the need and purpose of notation?
2. What are the different ways in which notations can be created in the DDC?

Long Answer Questions

1. Discuss the types of notation.
2. Explain the functions of notation.

7.10 FURTHER READINGS

Parkhi, RS. 1960. *Library Classification: Evolution and Dynamic Theory*. Bombay: Asia Publishing House.

Raju A. 1991. *Universal Decimal Classification.* Madras: T.R. Publishers.

Ranganathan SR. 1963. *Colon Classification*. Sixth Edition. Bombay: Asia Publishing House.

Ranganathan, SR. 1965. *Prolegomena to Library Classification,* Second Edition. London: Library Association.

UNIT 8 COMMON ISOLATES

NOTES

Structure

8.0 INTRODUCTION

Knowledge, which is the predominant basis of library classifications, is an abstract entity. It cannot have any form by itself. It requires some physical medium for its capturing, dissemination, and preservation. A document which is a source of knowledge has always some physical form and some subtle form created by the author. According to Ranganthan (1974), a document is a trinity of Gross body + Subtle body + Soul. Soul refers to its subject and the way it has been presented in the book. Subtle body refers to its language and the view point of the author. Gross body refers to its media such as Book, Journal, CD, Microform, etc. Library classification deals with documents. It, in effect, deals with information as recorded in documents. Therefore, library classification has to take into full account the outer and inner attributes of these physical objects embodying knowledge. It may be described by the following equation:

Library Classification = Knowledge Classification + Viewpoint of the presentation of the text + Physical attributes of the document = Subjects + Internal form + External form. In this unit, you will learn about the different kinds of isolates. Additionally, you will also study about the standard sub-division in Dewey Decimal Classification (DDC). Also, you will be able to explain the variety of devices used in Library Classification.

NOTES

8.1 OBJECTIVES

After going through this unit, you will be able to:

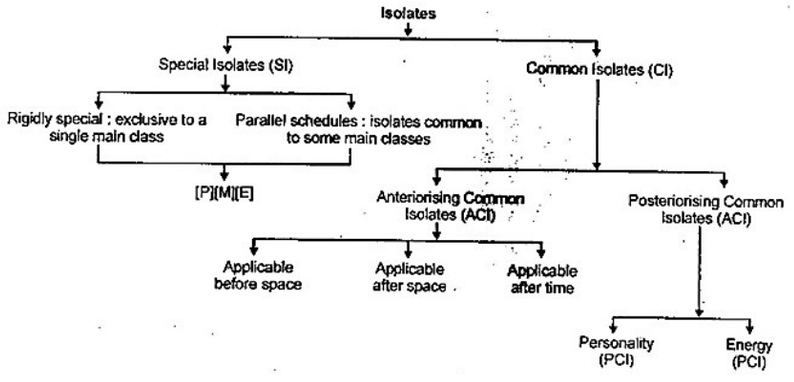
- Describe the meaning of isolates and the kinds of common isolates
- Discuss the standard sub division in DDC
- Elaborate the variety of devices used in Library Classification

8.2 COMMON ISOLATES: AN OVERVIEW

An isolate in the Colon Classification (CC) is a fundamental and ultimate unit of knowledge. By itself it cannot stand; so alone it cannot make a subject. Isolates enumerated specially and exclusively for a particular main class are termed Special Isolates. In contrast to these, isolates enumerated once for all and which remain the same for every main class are veritably termed as Common Isolates. It may be stated that the Common Isolates (CIs) represent mere auxiliaries, and are not part of the subject proper. They are recurring concepts and mostly pertain to the form of presentation, or the extra textual aspects of a document. Since they are listed once for all, their names and notational symbols remain the same wherever they occur. Of the common isolates Ranganathan maintains that they are attachable to most of the classes, though not all. They stand for divisions such as encyclopedia, dictionary, periodical, bibliography, biography, statistics or forms of presentation such as history, commission report and conference proceedings. Institutions, centres, research, and criticism are also Common Isolates. To arrange the subjects in a real Apupa pattern much depends upon these Common Isolates. These Common Isolates denote shades of subject intensity of the core of a document. Without Common Isolates there cannot be any Apupa pattern. Not only can't this, with even one kind of Common Isolates, as in the case of DDC, there be the real Apupa pattern.

8.2.1 Kinds of Common Isolates

Ranganathan divided the Common Isolates into two categories and further sub-categories, which may be best represented diagrammatically. Broadly speaking they are of two kinds: 1. Anteriorising Common Isolates (ACIs) 2. Posteriorising Common Isolates (PCIs)



NOTES

Anteriorising Common Isolates (ACIs)

When attached to a subject they give it an anterior position over other subjects of the same class. Their other feature is that they do not require any connecting symbol in the CC-6. Documents attached with Anteriorising Common Isolates (ACIs) form the approach documents on the shelves in the CC-6 they are of three kinds:

Some of the common isolates in the CC-6 are as follows:

ACIs:

a Bibliography
k Encyclopedia
m Periodical
p Conference
v History
r Report
s Statistics
w Biography

Posterorising Common Isolates (PCIs)

These require a connecting symbol and are filed after the core documents:

Energy PCIs:

b2 Designing
f Research
g Critical Study

Personality PCIs

d Institutions
e Educational institutions
g Associations

It may be noted that in addition to the so called CIs there are common schedules of Space and Time Categories.

Physical media

Form of the document is also a facet in his long formula for book number. These mostly represent the media of the document.

b Index
d Data book

NOTES

f Picture book
g Parody
p1 Lecture
q Code
w1 Verse
x Quotation
x4 Press Cutting

8.2.2 Common Isolates in Colon Classification

The common isolates in CC are quite different from those studied in DDC. Though the purpose and need for common isolates are the same, the number of common isolates and their application differ in CC. It has clearly differentiated common isolates. Common isolates are defined in CC as those which denote the same isolate term and are represented by the same isolate number. The family of common isolates in CC is also very large. There are several types of common isolates which can be seen at a glance from the diagram given below. Types of Common Isolates in CC

Up to the sixth edition of CC there had been a clear distinction between anteriorising and posteriorising common isolates. Anteriorising common isolates were attached to a host (core) number without any connecting symbol, whereas posteriorising common isolates were attached with a connecting symbol. In the seventh edition that distinction has been removed. However, they have retained the same function assigned to them in the earlier editions. Anteriorising Common mean that they have precedence in arrangement over the class numbers to which they have been attached. In short, the anteriorising common isolates have the anterior value. To explain this with an example, in the arrangement of class numbers V, 54 and, 54"a, V, 54" comes before NF, 54 in the sequence of classes. Documents such as bibliographies, encyclopaedias, periodicals and histories of a subject are approach documents, and as such, they must precede other core documents on the subject in the arrangement on the shelves. Some of the anteriorising common isolates are listed below: Anteriorising common isolates applicable before space facet

a – bibliography
c - concordance
d – table
f – atlas

NOTES

k – cyclopaedia

m – periodical

p - conference proceedings

v - history

w - biography

Anteriorising common isolates applicable after space facet

r - periodical administration report

s - statistics (serial) Anteriorising common isolates Applicable after time facet

T - commission report

t4 - survey v - source material v46 - genealogy v6 chronology .For a full list of anteriorising common isolates,.

Posteriorising Common Isolates in CC

Posteriorising common isolates are of three types, personality, matter and energy' common isolates. They are to be attached to the host (core) class with their respective connecting symbols, viz., comma, semi colon and colon. A personality common isolate stands mainly for institutions, some of which are as follows:

f - investigating- institution

f2 - observational institution

f3 - laboratory g - learned body

h6 - museum

y - cultural organisations

Personality common isolates are listed of the seventh edition of CC. Matter, Energy, Space and Time Isolates in CC There is an exhaustive list of energy and matter common isolates on pages 93 to 104 of the seventh edition of CC. The number of energy common isolates in the sixth edition of CC was small. The matter common isolates appear for the first time in the seventh edition. Space and time are regarded as common isolates and are listed separately. They can be attached to any host class number whenever warranted. A few examples of their use are given in the next subsection below.

Criticism

Common Isolates as devised by Ranganathan to help specify every document but Ranganathan is bit presumptuous to think that all the (ACIs) form approach documents to the core subject. Nobody reads periodicals or conference reports before he/she has a sufficient basic knowledge of the subject. Therefore, these should have been placed in a posterior position.

NOTES

Documentary Forms

As depicted in the equation, these documentary forms are both internal and external. For example, it may be expedient in a library to separate a microfilm, or a CD-ROM, from a book, though the specific subject of these three may precisely be the same. It is equally expedient to distinguish between a dictionary and a periodical of a subject; as well as the philosophical viewpoint from the historical one of the same subject. Form is a secondary feature. That is why in the UDC these are included in the auxiliary tables. If we classify by subject and then by form, we may note that the term 'form' covers different things. Outer form is the term which denotes dictionaries, essays, serials; it is a physical form or a mode of presentation that we can immediately recognize. Inner form, on the other hand, is a term used to denote forms such as Philosophy, History and Theory. Here the form, being closely interwoven with the subject of the book, is difficult to separate from it. 'Outer form may thus be regarded as the literary shape in which a volume is presented; inner form is subjective, the method by which the subject is presented, or the viewpoint from which an author regards a subject in his text. Inner form restricts or helps to define subject content, but outer form does not', writes Maltby (1975).

8.3 STANDARD SUBDIVISIONS IN DDC

To account for such physical and intangible attributes of the documents, Melvil Dewey (1851-1931) in the second edition (1885) of his scheme separated such non-subject forms of the documents and listed them in the beginning of each division. These tables could be added to class number, and always remained the same in name and notation. These were termed as Form divisions, as these mostly stood for the forms of the documents. In the second edition they were listed at the beginning of each of the 100 Divisions. In the succeeding editions of the DDC form divisions were expanded, and given once for all in a table at the beginning of the schedules. In the seventeenth edition (1965) these form divisions were renamed to 'standard subdivisions', as the recurring non-subject divisions listed there had obviously outgrown the form divisions. Now, these include some recurring viewpoints, and even facet indicators as they stand now. What started truly as 'form divisions' have evolved (with the complexities and varieties of incoming documents) to an agglomeration of some complex but recurring concepts termed as standard subdivisions.

Current Situation:

The standard subdivisions as they stand today in the DDC23 (Volume 1, pp. 179-209) may broadly be categorized under various viewpoints such as philosophy, history, research; Physical (Bibliographic) forms of the document, such as serials, pictures, maps; Facet indicators such as 04, 08 and 09 to introduce a new facet.

NOTES

The scope of the standard subdivisions has been widened so much that it is advisable to go through Table 1 (in volume 1) to know their scope and variety. Knowledge of their nature and scope will surely add to the efficiency of classifiers.

Rules for adding standard subdivisions to a class number have been provided in the Introduction to the Dewey Decimal Classification (DDC) in Volume 1. Some brief instructions to apply them and the order of preference also precede the Table 1. Many instructions regarding standard subdivisions (ss) are found in the manual included in the Introduction.

Rules for adding an SS are summarised as follows:

- The standard subdivisions usually represent recurring non-primary aspects of the subject and the document.
- They start with 0 which acts as a facet indicator. In some cases, on instructions, a standard subdivision may require more than one 0 for adding to a class number.
- A standard subdivisions by itself has no meaning; it gets meaning when attached to the class number.
- A Standard subdivision is added to the ultimate schedule number of the document in question.
- Having reached the most specific class number, we do not necessarily need an invitation to add a standard subdivision from the Table.
- A standard subdivision is applicable to any class number, however broad or minute, unless they are disallowed.
- These are not applied mostly in two cases namely, when the subject has no unique place of its own but has been placed with some other subject as a guest. The other reason for not applying it is its redundancy. For example, Dictionary of English language does not require ss-03; History of India 954 will not require the ss-09 for obvious reasons.
- These may be further extended by any number from the schedules or tables.

  -01 Theory and philosophy
  -02 Miscellany
  -03 Dictionaries, encyclopaedia
  -04 Facet indicator
  -05 Serial publication/ Journals
  -06 Institutions, Associations, etc.
  -07 Study, teaching and research
  -09 Historical and geographical treatment
  -08 Collections

NOTES

Other Tables

At present there are five more other auxiliary tables in the DDC. These mostly pertain to subject recurring aspects. These are:

T2 Geographical areas

T3 Subdivisions applicable mostly to literature

T4 Subdivisions applicable to linguistics

T5 National and ethnic groups of people

T6 Languages of the world

The T2 and T5 are applicable throughout the schedules either on invitation or added with a facet indicator by the classifier, if needed. T6 is strictly applicable on instructions. These tables have increased the synthetic power of the DDC and made it more faceted.

Uniform Tables for Common Isolates

After studying few important classification schemes we have prepared uniform tables for Form Divisions (Common Isolates), geographical divisions and time isolates. These uniform tables can replace existing tables without much structural changes. In case a new uniform classification is evolved in near future to meet the requirements in electronic environment, these tables can easily be used. The Uniform tables have been prepared in such a way that existing structure of notation in three schemes do not change. The uniform table is more comprehensive, contemporary and logically arranged. Uniform tables are one step ahead as they are common for all these three schemes. The uniform tables have two types of notation Pure Indo-Arabic Numerals and Mixed Roman Alphabets and Indo-Arabic Numerals. Column one used only pure notation with Indo-Arabic Numerals. Column two and three used mix notation both Indo-Arabic Numerals and Roman Alphabets (both capital & small). Hierarchy has been maintained in column one and two so the notation is longer. In the notation given in column three hierarchies are not maintained to make the notation shorter. Mixed notation schemes like CC 6 & CC 7 have option to use either longer notation or shorter notation (in column two or three). They can also use notation given in column one. Pure notation schemes like DDC & UDC have no choice but to use notation given in column one. Uniform Classification Code (UDC) may use either one.

The uniform tables for Form Divisions (Common Isolates) can be used by any scheme: - DDC can substitute Table 1. Standard Subdivisions by the uniform table for Form Divisions (Common Isolates). Notation given in column one prepared for pure notation schemes may be adopted. A zero already exists in this table. '04' is available for special topics, '08' in uniform table has been used for 'Institution and Professions'. In DDC it has been used for 'History and description with respect to kinds of persons', which have been eliminated. If required these

may be acquired from T7. '09' is assigned for 'Geographical & Historical Periods'. Thus notational structure of DDC will remain the same. More zeros can be used as per instructions given in the schedule for the use of 01- 08, e.g. Directories of adult education 374 + - 0015 = 374.0015 Dictionary of public administration 350 + - 00011 = 350.00011 Similarly Use of 09 will also be done as per instructions given in the schedules. In DDC scheme there is no provision to use two Standard Subdivisions together. If DDC permits use of a hyphen to add two or more Standard Subdivisions at a time this problem can be solved.

8.4 DEVICES IN LIBRARY CLASSIFICATION

One or more of the following devices may be employed to form or sharpen the focus in devices are:

1. Chronological Device;
2. Geographical Device;
3. Subject Device;
4. Mnemonic Device;
5. Alphabetical Device; and
6. Superimposition Device.

Chronological Device (CD)

It consists in using the appropriate Chronological Characteristic for the formation or the subdivision of an isolate, capable of chronological formation or subdivision, or when the individualisation of the isolates or sub isolates may be made to depend conveniently on the period of origin or birth or on the year of first investigation or on the year of discovery or on the year of initiation or commencement or on the year of occurrence or on the year that may be definitely associated with the respective isolates in any other manner or for any other reason. Some of the cases where this device may be employed are generally indicated either in the Schedules or in the Rules. Similar cases, where it may be employed, will suggest themselves in the course of actual classification.

Geographical Device (GD)

It consists in using the appropriate Geographical Characteristic (that is, continent, country, state, district etc., as the case may be) for the formation or the subdivision of an isolate which is capable of such formation or subdivision, or when the individualisation of the isolates, or sub· isolates, may be made to depend conveniently on the place of origin or prevalence or habitation or one that may be definitely associated with the respective focus in any other manner or for any other reason.

NOTES

Subject Device (SD)

It consists in using the appropriate Class Characteristic for the formation or the subdivision of an isolate which is capable of such formation or subdivision, or when the individualisation of the isolates, or sub-isolates, may be made to depend conveniently on a class that may be definitely associated with the respective foci in any manner or for any reason. The cases where this device may be applied are generally indicated either in the Schedu1es or in the Rules.

Mnemonic Device (MD)

It consists in choosing the digit for the further division of a class, i.e. the formation or the sharpening of a focus, in accordance with a convention in regard to the different possible significances of the digits available for use.

Alphabetical Device (AD)

It consists in using the first or the first two, or the first three, etc., initial letters (all in caps) of the name of an entity, existential or conceptual, for the formation or the subdivision of an isolate.

Superimposition Device

When an isolate is not scheduled in a facet but can be regarded as the mutual crenulation of two of the scheduled isolates, it is called a Superimposed Isolate.

8.4.1 Examples of Various Devices in Library Classification

1. **Chronological Device – Examples:**

   In CC, the Chronological Device has been used for the individuals actions of

   a) Author is a schedule of Literature. William Shakespeare (born 1564)

      0111, $\underset{\text{CD}}{\underline{2J64}}$

   b) Artificial language is the schedule of Language classes

      Ido language P 99 $\underset{\text{CD}}{\underline{NI}}$

   c) Religious Sects in the schedule of Religion.

      Arya Samaj Q29 $\underset{\text{CD}}{\underline{M8}}$

   d) Styles in Fine Arts Moghul Architecture NA44, $\underset{\text{CD}}{\underline{J}}$

NOTES

e) Equations, Functions, Series and So on in Mathematics
Pell's Equation B13, 3K
CD

f) Different Systems in Basic Classes such as Physics, Medicine, Psychology, Education and Economics
Relativity CN
CD

Homoeopathy LL
CD

Psycho-analytic System S M9
CD

Wardha Education Systm T N3
CD

Socialism X M2
CD

g) Several of the Anterionising Personality of Common Isolates.
Indian Journal of Library Science (Since 1960) 2 m 44, N 60
CD

h) Several other places in the Schedules.

2. **Geographical Device – Examples:**

a) Community in Main Classes in 'V' Histroy and 'Z' Law
Indian History V, 44
GD
Indian Law Z 44
GD
Japanese Community Y 7 42
GD

b) Style in Fine Arts Moghal Architecture NA 44, J
GD

c) Formation of Other Religion in MC 'Q' Religion
Sikkhism Q 441
GD

d) G.D. used Language Isolates
Chinese Literature O 41
GD

NOTES

e) Several of the Anterior sign Personality
Common Isolates
Indian Journal of Library Science (Scince 1960)
12 m 44, N 60
GD

f) Several Other Places in the Schedules.

3. **Subject Device – Examples:**

a) SD is used Space Isloates
English Speaking Countries 1 (P111)
SD

b) SD is used in Main Class '2' Library Science for other kinds of Librarries
Religious Libraries 24 (Q)
SD

c) SD is used in Main Class 'D' Engineering for other Machinery
Computer D 65, 8 (B)
SD

d) SD is used in Main Class 'X' Economics for various industries.
Iron Industry X8 (F182)
SD

e) SD is used in Main Class 'T'Education for other classes of Education and Teaching of Subjects.
Education of Rural Community T 9 (Y31)
SD
Methods of Teaching Algebra T:3 (B2)
SD

f) SD is used in Main Class 'S' for Vocational People
Psychology of Doctors S4 (L)
SD

g) SD is used in Main Class 'Y' Sociology for Ethnological Divisions etc.
Sociology of Hindi Speaking Community Y73 (P152)
SD

h) Sd is used in other Main Classes in the detailed Schedule.

4. **Mnemonic Device – Examples:**

In C.C. in several schedules, the following digits secure Mnemonic features.

For example Digit 4 stands for Heat, Pathology, Disease, Transport, Interlinking, Synthesis, Hybrid salt etc.

Animal Diseases K : 4
Human Diseases L : 4

Social Pathology Y : 4
MD

The Foci in (P2) of 'W' Political Science are the same as in 'V' History.
The Foci in (E) and (2P) of 'I' Botany are the same as in 'G' Biology.

NOTES

5. **Alphabetical Device – Examples:**

   a) Brands of Machine – Hero Cycle D5125 H
   AD

   b) Works of literary and classical authors
   Macbeth by W. Shakespeare 0 111, 2J64, M
   AD

   c) Varieties of Cultivars
   Ponni Rice J381 P
   AD

   d) AD is used in the Main Class 'L' Medicine for getting the number for Specials. Child Medicine L 9 C

   e) Several Other Places in the Schedules.

6. **Super Imposition Device – Examples:**

   a) SID is widely used in the Personality Facet of the Subject 'L' Medicine.
   Vein of Arms L 163 – 36

   b) SID is used in Space Isolates to represent Empires and Colonies.

French Colonies in world	VI-53
French Colonies in India	V44 – 53

   c) SID is used in the Personality Facet of the Main Classes. Psychology, Education and Sociology.

Psychology of Female Child	S1-55
Education for Female University Students	T4-55
Sociology of Urban Women	T15-35.

Check Your Progress

1. What is an isolate in the colon classification?
2. List the viewpoints under which standard subdivisions are categorized.
3. Name the devices in library classification.
4. What is chronological device?

NOTES

8.5 ANSWERS TO CHECK YOUR PROGRESS

1. An isolate in the Colon Classification (CC) is a fundamental and ultimate unit of knowledge. Common Isolates (CIs) represent mere auxiliaries, and are not part of the subject proper. They are recurring concepts and mostly pertain to the form of presentation, or the extra textual aspects of a document.
2. The viewpoints under which standard subdivisions are categorized in current situation are philosophy, history, research; Physical (Bibliographic) forms of the document, such as serials, pictures, maps; Facet indicators such as 04, 08 and 09 to introduce a new facet.
3. The names of the devices in library classification are as follows:
   (a) Chronological Device;
   (b) Geographical Device;
   (c) Subject Device;
   (d) Mnemonic Device;
   (e) Alphabetical Device; and
   (f) Superimposition Device
4. Chronological Device uses the appropriate Chronological Characteristic for the formation or the subdivision of an isolate, capable of chronological formation or subdivision, or when the individualisation of the isolates or sub isolates may be made to depend conveniently on the period of origin or birth or on the year of first investigation or on the year of discovery or on the year of initiation or commencement or on the year of occurrence or on the year that may be definitely associated with the respective isolates. Some of the cases where this device may be employed are generally indicated either in the Schedules or in the Rules.

8.6 SUMMARY

- An isolate in the Colon Classification is a fundamental and ultimate unit of knowledge. By itself it cannot stand; so alone it cannot make a subject.
- Isolates enumerated specially and exclusively for a particular main class are termed Special Isolates. In contrast to these, isolates enumerated once for all and which remain the same for every main class are veritably termed as Common Isolates.
- Ranganathan divided the Common Isolates into two categories: Anteriorising Common Isolates (ACIs), Posteriorising Common Isolates (PCIs).

- Common isolates are defined in CC as those which denote the same isolate term and are represented by the same isolate number. The family of common isolates in CC is also very large.
- Anteriorising common isolates were attached to a host (core) number without any connecting symbol, whereas posteriorising common isolates were attached with a connecting symbol.
- Posteriorising common isolates are of three types, personality, matter and energy' common isolates.
- The standard subdivisions as they stand today in the DDC may broadly be categorized under various viewpoints such as philosophy, history, research; Physical (Bibliographic) forms of the document, such as serials, pictures, maps; Facet indicators such as 04, 08 and 09 to introduce a new facet.
- Chronological Device, Geographical Device, Subject Device, Mnemonic Device, Alphabetical Device and Superimposition Device are some of the devices used in Library classification.

8.7 KEY WORDS

- **Subtle:** It refers to something which is as delicate or precise as to be difficult to analyse or describe.
- **Encyclopedia:** It refers to a book or set of books giving information on many subjects or on many aspects of one subject and typically arranged alphabetically.
- **Bibliography:** It refers to a list of books referred to in a scholarly work.
- **Facet:** It refers to a particular aspect or feature of something.
- **Redundancy:** It refers to the state of being not or no longer needful or useful.
- **Chronological:** It refers to an act following the order in which a series of events happened.

8.8 SELF-ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions

1. Write a short notes on Anteriorising Common Isolates (ACIs) and Posterorising Common Isolates (PCI).
2. State the names of auxiliary tables in the DDC.
3. What is the criticism associated with common isolates?

NOTES

Long Answer Questions

1. Describe the rules for adding a Standard Subdivision in DDC.
2. Explain Common Isolates in Colon Classification.
3. Explain all the devices in library classification.

8.9 FURTHER READINGS

Parkhi, RS. 1960. *Library Classification: Evolution and Dynamic Theory*. Bombay: Asia Publishing House.

Raju A. 1991. *Universal Decimal Classification.* Madras: T.R. Publishers.

Ranganathan SR. 1963. *Colon Classification*. Sixth Edition. Bombay: Asia Publishing House.

Ranganathan, SR. 1965. *Prolegomena to Library Classification,* Second Edition. London: Library Association.

NOTES

BLOCK - III
CLASSIFICATION OF SCHEMES

UNIT 9 SCHEMES OF LIBRARY CLASSIFICATION

Structure

9.0 INTRODUCTION

Information can be collected from a variety of sources. A major source of information are documents, which can be used to record, manage and organize information. The use of documents is central to the analysis and interpretation of information. Information processing is a continuous process of collecting, classifying, managing, organizing and retrieving information so that it can be used for several purposes. There are many types of documents that can be used for various operations and applications. There are various ways in which documents can be classified and used.

Information needs to be shared or disseminated for making it useful. For information dissemination, its retrieval is essential. Information practice deals with the basic guidelines to store, manage, share and retrieve information.

In this unit, you will study the basics of documents wherein you will learn about document classification, characteristics, techniques of document classification, and so on. Moreover, you will come to know about the different methods used for classifying various types of documents.

NOTES

9.1 OBJECTIVES

After going through this unit, you will be able to:

- Discuss various document classification techniques
- Explain Dewey Decimal classification
- Explain the universal decimal classification method
- Examine what colon classification entails

9.2 HISTORICAL DEVELOPMENT OF LIBRARY CLASSIFICATION

The evolution of any subjects is based on principles similarly the subject of library classification is based on principles. This principle provides a scientific base to the library classification.

The necessity of principles of library classification was felt to arrange the knowledge in an organised manner. In this context, Sh. R.S. Parkhi divided the principles of library classification in two types:

1. Descriptive Theory

It is the first phase of evaluation of the principle of Library Classification. The aim of these principle is to provide a structural base to subjects. Various scientists have contributed for the development of Descriptive Theory, which is as under:

James Diff Brown:

- Examples of Descriptive Theories produced from 1898 to 1937.
- Mannual of Library Classification and Self Arrangement.
- Library Classification and Cataloguing.

Richardson:

- Classification Theoretical and Practical.

Sayers:

- Canons of Classification.
- Grammar of Classification.
- Introduction to Library Classification.
- Manual of Library Classification.

Bliss:

- Organization of knowledge and the system of sciences.
- Organization of knowledge in libraries and the Subject Approach to Books.
- System of Bibliographic Classification.

Ranganathan:

1. Prolegomena to Library Classification. Various Library classification schemes have been developed during the period, 1876 to 1936, which are as under:
    - Dewey Decimal Classification (1876) by Melvil Dewey.
    - Expansive Classification (1893) by C.A. Cutter.
    - Universal Decimal Classification (1899)
    - Library of Congress Classification (1901)
    - Subject Classification (1906) by J.D. Brown.
    - Colon Classification (1993) by S.R. Ranganathan.
    - Bibliographic Classification (1935) by H.E. Bliss.

2. Dynamic Theory

This principle is important in library classification and these principles have contributed a lot in the development of the field of library classification.

This principle provides a technical base in the designing of library classification. The development of knowledge can be arranged in a helpful < sequence with the help of this principle in library classification scheme without any problem.

In 1948, Jean Anker, librarian of the National Science Library, Denmark, met Ranganathan and requested him to publish a book on Library Classification. In 1950, a conference was organized by Royal Society, London to discuss library classification and in 1951, the book named, Classification and Communication was published.

As per S.R. Parkhi, the second addition of the book, Prolegomena of Library Classification by Dr. Ranganathan, was the first book in the field of Dynamic Theory. D.R.D.C. was established for the development of principles of library classification. This establishment is working till today in the field of library classification.

9.3 LIBRARY CLASSIFICATION SCHEMES: DDC, UDC AND CC

Let us now analyse the various library classification schemes.

9.3.1 Dewey Decimal Classification

In a library system, documents need to be maintained in a manner that facilitates easy access and retrieval of information contained therein. For this, the documents need to be classified on the basis of some specific system or rules. One of the most popular classification methods for documents in libraries is Dewey decimal classification (DDC). It is a proprietary library classification system that was first published in the United States in 1876. Over the years, several changes have been

NOTES

incorporated in this classification system and is today available for use online as well as for small libraries.

DDC uses the concepts of relative location and relative index, which allow documents or books to be added to the library in an easy manner based on the subject of the book or the document. DDC makes use of three digit Arabic numerals for the main classes of documents. It also uses fractional decimals to allow expansion within the classes of the documents. Each document is assigned a classification number under this system of classification. This number can be used to locate the document in a position relative to other books in the library based on the subject of the book. The classification number makes it possible to find and return any book to its proper location in a library.

This system of document classification follows a hierarchical structure of organizing the various documents. The documents are classified or organized according to the field of study that the document belongs to. The scheme is made up of ten classes divided into ten subclasses, which are further divided into ten sections. The main divisions in this classification system include philosophy, social sciences, science, technology and history. A number is allotted to each subject in this system of document classification. Each number has two parts: a class number and a book number, to avoid any type of confusion when it comes to locating and returning the book to the right place.

Classes and Tables in the DDC

The DDC uses the following classes:

- 000 – General Works, Computer Science and Information
- 100 – Philosophy and Psychology
- 200 – Religion
- 300 – Social Sciences
- 400 – Language
- 500 – Pure Science
- 600 – Technology
- 700 – Arts and Recreation
- 800 – Literature
- 900 – History and Geography

The various tables in DDC are as follows:

- T1 Standard Subdivisions
- T2 Geographic Areas, Historical Periods, Biography
- T3 Subdivisions for the Arts, for Individual Literatures, for Specific Literary Forms
- T3A Subdivisions for Works by or about Individual Authors

- T3B Subdivisions for Works by or about More Than One Author
- T3C Notation to Be Added Where Instructed in Table 3B, 700.4, 791.4, 808–809
- T4 Subdivisions of Individual Languages and Language Families
- T5 Ethnic and National Groups
- T6 Languages

The DDC uses a relative index, which is an alphabetical index to the classification for retrieval of the required documents.

Implementation of DDC: Case Study

Case Study 1—Use of DDC in Oxford Brookes University

The Oxford Brookes University Library uses DDC for arranging books and other library materials on shelves so that the library materials can be easily retrieved.

DDC is a hierarchical number system that organizes all human knowledge into ten main categories, which are: 000 Computer Science, information and general works; 100 Philosophy and psychology; 200 Religion; 300 Social science; 400 Language; 500 Science; 600 Technology; 700 Arts and recreation; 800 Literature; and 900 History and geography.

Each main category is then divided into ten sub-categories. For example: 500 Science—510 Mathematics; 520 Astronomy; 530 Physics; 540 Chemistry; 550 Earth sciences and geology; 560 Fossils and prehistoric life; 570 Biology; 580 Plants (Botany) and 590 Animals (Zoology).

Each sub-category is then also divided into ten specific topics. For example: 530 Physics—531 Classical mechanics; 532 Fluid mechanics; 533 Gas mechanics; 534 Sound and related vibrations; 535 Light and related radiation; 536 Heat; 537 Electricity and electronics; 538 Magnetism and 539 Modern physics.

Each of these topics may be further divided into more specific subject areas. A decimal point is used after the first three digits to separate the specific subjects—it also makes the numbers easier to read. You will see that as the subject becomes more specific, so does the numbering. For example: Sound and related vibrations—534.1 Generation of sound; 534.2 Transmission of sound; 534.22 Transmission in solids and 534.23 Transmission in liquids.

DDC at Oxford Brookes: When an item arrives in the library, it is assigned a DDC number, often called the 'classmark' or 'shelfmark'. Each of the numbers in this shelfmark has a meaning and is not assigned randomly. For example, the book 'The Royal Doctors 1485-1714' by Elizabeth Furdell has been assigned the shelfmark 610.6952094205 FUR. These numerals indicate the following:

610 = Medical sciences

610.6 = Professions

610.69 = Medical personnel

NOTES

610.695 = Specific kinds of medical personnel

610.6952 = Physicians

610.69520942 = Physicians in England and Wales

610.6952094205 = Physicians in England and Wales 1485-1603

Most items will also be assigned some letters at the end of the numerals, 'FUR' in the above example. These are taken from the author's surname or the first word of the title.

Finding items on the shelves: The shelf-mark will always have at least three numbers, followed by some letters. It is usually displayed on the spine of the item, but is sometimes placed on the front cover. Here are some examples: 361.HIG— the DDC system places items about the same subject at the same number. This means that once you have identified the DDC number for the subject you are interested in, you can browse the shelves at that number. On each shelf, the items are arranged in a numerical sequence from left to right by their DDC number. Where several items have an identical DDC number, the letters are used to further arrange them. For example: 361.32.BOR and 361.32.STO.

Journals: Journals are also shelved in a separate section. The same DDC numbers are used, but the catalog shows these items with a shelfmark that is preceded by 'J', and it only has one letter after the numbers. For example, the journal 'Nursing Standard' has the shelfmark J 610.73 N.

9.3.2 Universal Decimal Classification

Universal decimal classification (UDC) is another system of document classification, which is used widely. UDC is basically a bibliographical and library classification system that was developed by Belgian bibliographers Paul Otlet and Henri La Fontaine. These bibliographers first introduced this classification system at the end of the 19th century. Since then, the UDC has undergone many changes and is used across the globe today. UDC allows systematic arrangement of all branches of human knowledge. It is based on a coherent system of knowledge wherein the knowledge fields are related and inter-linked.

UDC was based on the DDC and was developed originally as an analytical and synthesizing classification system. The vocabulary that the UDC covered was large. Also, the UDC included syntax that allowed detailed content indexing and also information retrieval from large collections of documents.

The first edition of UDC was launched in 1905. In this edition, many features were included that changed the way document classification wad done and viewed. One of these features included common auxiliary tables, which were tables that described generally used concepts. Another feature was special auxiliary tables. These tables described reusable attributes in a particular field of knowledge. UDC also included an expressive notational system with connecting symbols and syntax rules.

UDC was originally designed as an indexing and retrieval system. However, due to its logical structure and scalability, today UDC is one of the most widely used knowledge organization systems in libraries. It is used both for content indexing of documents in libraries and also for shelf arrangement of documents. UDC works for a variety of documents including textual documents, films, video, sound recordings, illustrations, maps, and so on.

Since the first edition in French in 1905, UDC has been translated and published in various editions in 40 languages. UDC Summary is the abridged edition that can be used on the Web and is available in over 50 languages. The system has also been changed and modified to meet the changing needs and demands of increasing human knowledge.

Use of UDC

UDC is used in around 1,50,000 libraries in 130 countries across the globe. It also finds application in many bibliographical services wherein detailed content indexing is required. UDC is used as a system of information exchange in many countries. It finds use in several libraries, schools, special libraries and also academic libraries. UDC can be used to describe any type of document in the libraries in great details and so makes information management an easy task.

UDC is also used for indexing of scientific articles, which are important sources of information for science related topics. UDC has also been used to index national bibliographies of around 30 countries.

UDC has been used to index NEBIS—the Network of Libraries and Information Centers in Switzerland. UDC has indexed approximately 2.6 million records for NEBIS. There are several other articles, journals and documents of great importance that have been indexed and classified by UDC. Examples of databases indexed by UDC include the Slovenian National Union Catalog with over 3.5 million records, Hungarian National Union Catalog with around 2.9 million records, VINITI RAS database with over 28 million records, PORBASE with 1.5 million records and also Meteorological and Geo-Astrophysical Abstracts with 600 journal files.

UDC is a machine readable system and so can be used in automatic mechanical systems and even in new libraries effectively for the purpose of classification, retrieval and management of information in documents.

The standard version of the UDC is called the UDC Master Reference File. The standard version is maintained in a form of a database and is usually updated and releases annually. This ensures that the UDC contains a reference to the latest information. The UDC is always under review to take into account the latest and new developments and include these in the reference database.

NOTES

Structure of UDC

The UDC has a well-defined structure. Notation in UDC is used to represent class, which refers to a subject of the document. Notation is basically used to present the class and its position in the hierarchy. The main idea of using notations is to enable mechanical sorting and filing of the document subjects.

UDC makes use of Arabic numerals that are arranged in a decimal format. Every number in the UDC is a decimal fraction with the initial decimal point omitted. The number in decimal fraction decides the filing order of the documents. The advantage of using the decimal notation for classification of documents is that the decimal numbers are infinitely extensible. This simply means that when new subdivisions of classes are introduced, the entire system of numbering does not need to be changed. Instead, the decimal number can be extended using a decimal point for the new subdivision. Every decimal notation in UDC follows a set pattern. For the ease of reading and access, the UDC notation is punctuated after every third digit.

Example of Notations in UDC:

Notation	Class description
539.120	Theoretical problems of elementary particles physics
539.120.2	Symmetries of quantum physics
539.120.5	Strings
539.120.226	Space–time symmetries
539.120.3	Currents

The notations used in UDC have features that make it easy to work with. The UDC notations are hierarchically expressive, which means that they specifically name a class. In general, the longer the notation is, the more specific the class will be. When final digit is removed from the notation, the broader class code is obtained. For example, in the above notations, if we remove 3 from the notation 539.120.2, we get the broad class category, which is 'theoretical problems of elementary particles physics'. UDC notations are also syntactically expressive. This means that when digits are combined by punctuations, it points to the fact that the expression or the notation depicts a combination of classes rather than a single class.

UDC helps to define unlimited attributes for a subject and to express a relationship between these subjects. UDC is perspective classification system wherein concepts are subsumed and placed under categories where these can be studied. Thus, the same concept can occur in different knowledge domains. The best thing about UDC is that, even if a concept occurs in different domains of knowledge, there is no confusion regarding its usage in any way.

NOTES

Classes

Classes are the basic unit of UDC. These classes basically define and represent concepts. There are two kinds of tables or classes, namely auxiliary tables or classes and main tables or classes, in which concepts can be organized in UDC.

The auxiliary tables contain concepts that are generalized and common to several subjects in the main table. The concepts can be related to the language of the text, the place or physical form of the document and any other facet that is common to a large number of subjects in the main classes. These tables are called common auxiliaries and UDC numbers from these tables can be added at the end of a number taken from the main table. The number of common auxiliaries in UDC is around 1,50,000.

The main tables or classes of the UDC contain the various disciplines and branches of knowledge. The main classes are numbered 0–9. At the beginning of each class, there are several special auxiliaries that define the concepts common within the specific class. The main classes of UDC have approximately 6,00,000 sub-divisions.

Main Classes of UDC

UDC includes the following main classes or tables:

0: Science and Knowledge. Organization. Computer Science. Information Science. Documentation. Librarianship. Institutions. Publications.

1: Philosophy. Psychology.

2: Religion. Theology.

3: Social Sciences.

4: Vacant.

5: Mathematics. Natural Sciences.

6: Applied Sciences. Medicine, Technology.

7: The Arts. Entertainment. Sport.

8: Linguistics. Literature.

9: Geography. History.

Class 4 is a vacant class. The change was made in 1960 when the Linguistics were shifted to class 8 to make place for new developments taking place in the field of knowledge. The class was left vacant to accommodate new developments in the fields of natural sciences and technology.

Common auxiliary tables in UDC: The common auxiliaries in UDC are concepts that can be used with other main or auxiliary concepts of the UDC. The common auxiliaries are usually represented with some unique notation. The common auxiliaries begin with a unique symbol, which is called the facet indicator and

NOTES

defines the concept that the auxiliary class is representing. Following are the common auxiliary tables in UDC:

=...: Common auxiliaries of language. Table 1c.

(0...): Common auxiliaries of form. Table 1d.

(1/9): Common auxiliaries of place. Table 1e.

(=...): Common auxiliaries of human ancestry, ethnic grouping and nationality. Table 1f.

'...': Common auxiliaries of time. Table 1g.

-0...: Common auxiliaries of general characteristics: Properties, Materials, Relations/Processes and Persons. Table 1k.

-02: Common auxiliaries of properties. Table 1k.

-03: Common auxiliaries of materials. Table 1k.

-04: Common auxiliaries of relations, processes and operations. Table 1k.

-05: Common auxiliaries of persons and personal characteristics. Table 1k.

There are several connecting symbols used in UDC for easy understanding of the notation and to allow easy parsing. These connecting symbols make it easy for a person to understand the main class and the auxiliary class being referred to and, thus, the concept being referred to.

The commonly used connecting signs in UDC are as follows:

+ — This is the plus sign (+) that performs the action or coordination and addition. For example: 511 + 61 describes Number Theory + Medical Sciences.

: — This is the colon sign (:) that is used to describe a connection or relation between the classes or the concepts. For example, 33:37 shows the relation between economics and education.

/ — This is the stroke sign (/), which is used to describe a consecutive extension of classes. It simply means that one class is extension of another and contains everything that the first class contains.

[] — These are square brackets ([]), which are used for sub-grouping of classes and concepts within another class or a subject.

* — This is an asterix (*), which is used to introduce a non-UDC notation in the UDC notation.

A/Z — This is alphabetical extension that describes the alphabetical specification of a class.

Thus, using UDC documents are classified as main tables and auxiliary tables wherein the main tables represent a domain of knowledge or concept in the broad sense and the auxiliary tables represent the concepts within the specific domains of knowledge.

NOTES

The main table 0 is related to the concepts of Science and Knowledge and cover domains, such as organization, computer science, information, documentation, librarianship, publication and institutions. A few examples of documents covered by main class 0 are as follows:

001 — Science and Knowledge in general; organization of intellectual work

002 — Documentation, books, writings, authorship

003 — Writing systems and scripts

004 — Computer science and technology; computing

005 — Management

006 — Standardization of products, eights, measures and time

007 — Activity and organizing; information, communication and control theory (cybernetics)

008 — Civilization, Culture, Progress

01 — Bibliography and bibliographies; Catalog02 — Librarianship

06 — Organization of general nature

08 — Polygraphies, collective works

09 — Manuscripts, rare and remarkable works

069 — Museums

Class 1 relates to Psychology and Philosophy. Examples of main classes for the subject psychology include:

11 — Metaphysics

13 — Philosophy of mind and spirit; metaphysics of spiritual life

14 — Philosophical system and points of view

17 — Moral philosophy, ethics, practical philosophy

159.9 — Psychology

159.91 — Psychophysiology, mental physiology

Class 2 is related to religion and theology. 2–1/–9 is the special auxiliary subdivision for religion and can be used to talk about a facet of any religion. The main classes 21/29 talk about religious systems, religions and faith. Example: 24 is the class that talks about Buddhism, 28 talks about Islam. –5 is a special auxiliary that talks about worship in a specific religion. So, if we use UDC notation 24–5, it means we are referring to worship in Buddhism.

Class 3 in UDC is related to Social sciences. Examples of classes are as follows:

303 — Methods of social sciences

305 — Gender studies

316 — Sociology

NOTES

32 — Economics. Economic science

37 — Education

Class 5 of UDC refers to Mathematics and natural sciences. The examples of the classes are as follows:

502 — The environment and its protection

504 — Threats to environment

51 — Mathematics

510 — Fundamental and general considerations of mathematics

511 — Number Theory

512 — Algebra

514 — Geometry

53 — Physics

535 — Optics

54 — Chemistry, crystallography, mineralogy

55 — Earth sciences, geological sciences

56 — Paleontology

57 — Biological sciences in general58 — Botany

59 — Zoology

Class 6 of UDC talks of applied sciences, medicine and technology and takes up the largest proportion of the UDC. There are over 44,000 subdivisions of this class. A few examples of documents belonging to this class include:

60 — Biotechnology

61 — Medical sciences

611/612 — Human biology

62 — Engineering, technology in general

63 — Agriculture and related sciences and techniques, forestry, farming, wildlife exploitation

64 — Home economics, domestic science, housekeeping

65 — Communication and transport industries, accountancy, business management, public relations

66 — Chemical technology, chemical and related industries

67 — Various industries, trades and crafts

68 — Industries, crafts and trades for finished or assembled articles

69 — Building (construction) trade, building materials, building practice and procedures

Class 7 of UDC contains documents related to arts, recreation, entertainment and sports. The numbers 7.01/09 are special auxiliaries of this class and can talk

about various concepts related to these fields. Examples of documents in this class are:

71 — Physical planning; regional, town and country planning; landscapes, parks, gardens

72 — Architecture

73 — Plastic arts

74 — Drawing, design, applied arts and crafts

75 — Painting

76 — Graphic art, printmaking; graphics

77 — Photography and similar processes

78 — Music

79 — Recreation, entertainment, games, sport

Table 8 of the UDC is related to language, linguistics and literature. This table is a fully faceted table with special auxiliaries defining concepts within the specific subject. Class 81 is related to linguistics and languages. Class 82 is related to literature. 81–1/–9 refers to special auxiliary divisions of the literature class. For example: 82–2 refers to dramas and plays and 82–4 deals with essays.

Class 9 refers to geography, biography and history. This class is also completely faceted and the special auxiliaries of this class talk about place, time and ethnic grouping. Examples of documents contained in class 9 are as follows:

902 — Archaeology

903 — Prehistory. Prehistoric remains, artefacts, antiquities

904 — Cultural remains of historical times

908 — Area studies. Study of a locality

91 — Geography, exploration of the Earth and of individual countries, travel, regional geography

92 — Biographical studies, genealogy, heraldry, flags

93/94 — History

Each record in the UDC displays the following information:

- **UDC Number or Notation:** UDC notation is a combination of symbols, numerals, signs and letters that represent a class, the position of the class in the hierarchy and also the relation of the class to other classes. Notation is a language-independent indexing term that enables mechanical sorting and filing of subjects.
- **Class Identifier:** It is a unique identifier assigned to each class. It identifies the meaning of the relationship between the representation of the class and its notational number or UDC number.
- **Broader Class:** It represents a class, which is super-ordinate class, i.e., the class above the given class in the hierarchy.

NOTES

NOTES

- **Caption:** It is the verbal description of the content of the class.
- **Including Note:** It is the extension of the caption containing verbal examples of the class content. It usually is a selection of important terms that do not appear in the subdivision.
- **Application Note:** It contains instructions for number building, further extension and also for specification of the class.
- **Scope Note:** It is the note explaining the extent and the meaning of a UDC class. The scope note is used to resolve disambiguation or to distinguish this class from other similar classes.
- **Examples:** Examples of combination are used in the records to illustrate UDC class building and complex subject statements.
- **See Also Reference:** It indicates the conceptual relationship between UDC classes from different classes in the hierarchy.

UDC is the world's foremost multilingual classification scheme. It is used for all fields of knowledge and contains information related to anything that can be conceptualized in the human brain. UDC also acts as a sophisticated indexing and retrieval tool. It is maintained in a database containing more than 70,000 records.

Features of UDC

UDC is owned, managed, maintained, and distributed by an international consortium of publishers with its headquarters in The Hague. The editorial team of the UDC comprises of six Associate Editors led by an Editor-in-Chief and an advisory board of over 20 members.

The main features of the UDC are as follows:

- UDC is a practical bibliographic classification. It is considered as the first faceted classification. UDC is a synthetic classification, which is able to specify minute subjects, aspects, formats and the different related viewpoints.
- Its structure is flexible to accommodate new subjects. UDC allows changing the citation order easily and flexibly for shelf arrangement and searching of documents as and when required.
- UDC is the first official internationally used classification system, which has been published in French, German and English.
- The notation used in UDC is independent of any particular language or script. UDC is totally language independent. It has been translated many times and thesis translations have appeared in about 39 languages.
- UDC lays more emphasis on subject analysis and document specification.
- UDC is a multidimensional scheme. Its auxiliary synthesis of relations and concepts is very powerful and, thus, it can be easily used to define and describe relationships.

- UDC is more suitable for micro-documents, electronic information and information retrieval in online and networked databases and Websites. It makes information management an easy task.
- UDC is a general classification that covers a wide domain of knowledge and, thus, almost any subject that one can talk about.
- UDC is regularly revised so that all new concepts and developments can be included within the classes. The revision of UDC is a planned process and is carried out under the guidance of the UDC Consortium. The revision of the UDC is carried out with the help of specialists and subject experts.

Merits and Demerits of UDC

UDC is being widely used for retrieval of information especially from online documents. The following are the merits of UDC that make it apt for document classification and information retrieval:

- UDC uses an expressive notation, which makes retrieval of information very easy. The structure of UDC is hierarchical, which means that it progresses from general subjects to specific subjects and relationships. The overall structure is not theoretical, which makes it easy to understand this system of classification. UDC is based on the assumption that no single class can cover all aspects of a particular subject or context, and so, a wide range of classes is used in the classification system to make it easy to classify and retrieve information.
- UDC is a flexible method of classification of documents. It is flexible in the sense that it allows changes to be made easily to the order of the numbering of documents. The reason why UDC has been designed flexibly is to keep pace with new developments that take place in the field of knowledge. UDC is also more responsive to the complex changes that take place between interrelated subjects.
- UDC uses precision to classify and retrieve information. This is beneficial especially when information has to be retrieved from online resources.
- UDC allows easy browsing. It is a knowledge organization tool that allows hierarchical browsing. This is helpful for new users who are not familiar with the use and structure of UDC. Hierarchical browsing also implies that the search time for a known item in UDC is optimum and minimum.
- UDC is versatile classification system, which allows the accommodation of new subjects in an easy manner. Notations used in the UDC are versatile and thedecimal numbers are infinitely extensive making the addition of a new subject or knowledge document an easy task.
- UDC is based on the Synthetic Principle, which uses tables extensively to classify the documents and allows for the classification to become divisible.

NOTES

This means that the document classification can be extended to include several categories and viewpoints.

- One of the main benefits of UDC is the fact that it is continuously revised and maintained. The revision of UDC ensures that all the new subjects and information are added and made available for use from time to time. Maintenance of the UDC involves deleting obsolete terms, replacing these with new ones and also rectifying problems that arise in the UDC. This ensures that the classification system works effectively for every instance of information retrieval.
- Despite being widely accepted and used as a document classification system, UDC does suffer from the following drawbacks:
- UDC is based on DDC. It is known to be an enumerative classification scheme, which is feasible in a closed system of knowledge. UDC works well and the best where the material or the documents to be classified are not too many. UDC does not allow the addition of a newly found class into an existing class; rather it allows a new auxiliary class to be defined for the new class.
- UDC is not fully exploited. Though it is used widely, the DDC is still a more popular classification method in use.
- UDC is based on the assumption of universality. This means that it must cover all subjects with growing degrees of information. However, class 4 of the UDC lies vacant for a new evolving class. UDC also does not include kernels and concepts of the main classes.
- UDC uses a limited number of relational operators. The underlying semantic relationship is not clearly defined in the UDC. The UDC does define the relationship between the classes but fails to define the manner in which the classes influence each other.
- UDC uses a decimal notation to describe a class. The notation in some cases may be too lengthy whereas it should be as brief as possible. Sometimes, use of punctuations and auxiliaries in class notations also causes an error in the interpretation of the accurate class.
- Citation order problems are a major drawback of the UDC because no standards have been prescribed. In addition, the auxiliaries of the UDC are still developing, resulting in changes in notations often, which is a problem.

Principles of UDC

UDC is a classification system developed for arranging books and sub-titles in library shelves so that these can be easily found and retrieved. UDC is a system that allows for classification of the recorded knowledge and retrieval of this knowledge in an effective manner.

NOTES

Following are the principles on which UDC has been based:

- UDC is classification in the strict sense and is based on analysis of data, content and relationships that exist between the concepts. UDC does not arbitrarily classify documents and knowledge.
- UDC is a universal classification system that involves every field of knowledge and classifies the documents on the basis of integrated patterns and correlated subjects.
- UDC is based on the principle of proceeding from general to particular knowledge domains.
- UDC is a practical system for information retrieval. It focuses more on the detailed specifications rather than on the order of the subjects or the documents it classifies.
- UDC also takes into account the principles of mutually exclusive classes, collection of related subjects and consistency of approach.
- UDC notation consists of Indo-Arabic numerals used decimally, which allows infinite hospitality and social sciences.
- UDC is based on the principle of using notations that allow linking of a main class to the auxiliaries in an easy manner.
- UDC is a general classification scheme and not a bundle of special classification. It is rather an integrated whole.
- UDC makes use of synthetic devices, such as colon (:), permits coordination of a concept in different permutations, thereby, minimizing rigidity in the enumerated classification scheme.
- UDC avoids the lacunae of numerous private classification schemes by providing a standard system covering all the disciplines and may be used in any type of library.

UDC in Use: Case Studies

The following case studies discuss the use of UDC:

Case Study 1—UDC for Use in Scott Polar Research Institute

The Library of the Scott Polar Research Institute (SPRI Library) offers the world's premier polar information center. It is located within a department of the University of Cambridge. The library houses resources of national and international importance consulted by governments, industry, scientists and scholars. The library also houses World Data Centre for Glaciology, Cambridge and has special responsibilities for the provision of information to British and European glaciologists. The SPRI Archives contain the world's finest collection of unpublished material relating to the Polar Regions.

NOTES

For scientists and scholars, SPRI Library offers a collection developed since the 1920s with over 700 current journals and over 1,40,000 volumes covering all subjects relating to the Arctic, Antarctic, and ice and snow. For industry, it is a prime information source on such subjects as exploration and exploitation of natural resources and on the environmental implications of such activities in the Polar Regions. For government users, the library offers information for international relations and strategic defense.

The SPRI Library houses the following collection of information resources:

- **Arctic collections**: These are unique in covering all countries of the circumpolar north for all subjects and in all languages. There is no other library with similar collection. This collection contains substantial collections relating to the Arctic Ocean, European Arctic, and Russian North. The Arctic collections have information covering seas, such as the Arctic Ocean and adjacent waters: the various seas north of Russia (Chukchi, East Siberian, Laptev, Kara and White seas); Barents Sea; Norwegian Sea; Greenland Sea; Labrador Sea; Davis Strait and Baffin Bay; Hudson Bay; Lincoln Sea; waters of the Canadian Arctic Islands; Beaufort Sea; Bering Sea; the Sea of Okhotsk and the Gulf of Alaska. Land areas covered include Alaska (except for the Panhandle); Canadian Territories (Yukon and Northwest); those parts of Quebec and Labrador occupied by the Inuit; Greenland; Iceland; Svalbard; the European Arctic south to the Arctic Circle; and the Russian Federation in European Russia Asia, including all of Kamchatka and Sakhalin.
- **Antarctic collections**: These are the most famous collections in the library. It is presumed that these collections are not used in any other library of the world. These collections contain information both for the continent itself and for the surrounding ocean and sub-Antarctic islands.

  The Antarctic is taken to include the continent together with its surrounding waters and islands north to the Antarctic Convergence, such as Gough Island, the New Zealand Sub-Antarctic Islands, Iles Amsterdam and Saint-Paul, Iles Crozet, Macquarie Island, and the Prince Edward Island. This area corresponds to the zone of interest of the Scientific Committee on Antarctic Research (SCAR). The SPRI has had a long association with British Antarctic activities and so the library also aims to maintain good, but not exhaustive, holdings for the Falkland Islands and Tristan da Cunha focusing particularly on natural history and on historical and political issues with an Antarctic dimension.
- **Glaciological collections**: The SPRI has over 100 current periodicals, 35,000 entries on glaciology and related subjects in the library database. There are as many entries in the card catalog. The glaciological holdings

maintained by World Data Centre for Glaciology, Cambridge are very extensive and presumably not found anywhere else.

The SPRI has adopted a broad definition of the scope of glaciology. It collects publications on all topics relating to snow and ice in all languages and for all parts of the world. The glaciology collection is, thus, not restricted to the Polar Regions. Among subjects included are glacial geology, geocryology, glacio-astronomy and snow and ice engineering.

UDC for use in SPRI

The SPRI Library follows long-established cataloging practice as in the size and coverage of the collection itself. Since its foundation, a policy has been maintained of providing information access points to items at the analytic and not just at the main entry level.

Each entry provides sufficient bibliographic information for identification and location of the source document together with a brief abstract and appropriate index numbers derived from UDC. All cataloging, indexing and abstraction is carried out by specialist bibliographers possessing a range of linguistic, regional and subject expertise as per the classes and rules specified by UDC.

Subjects Covered by Scott Polar Research Institute Library

All subjects relating to the Polar Regions are included, with particularly good coverage for:

- Land and sea ice
- Snow and snow cover
- Geocryology
- Snow and ice engineering
- Geology
- Marine sciences
- Ice navigation
- Atmospheric sciences
- Global change: indicators and implications
- Environmental issues
- Zoology (especially sea mammals and birds)
- Indigenous peoples of northern Russia, North America and the European Arctic
- International law and policy
- History of exploration

NOTES

Geographical Locations Covered

The library database has particularly good coverage for:

- Alaska
- Antarctica (especially published results of historic expeditions)
- Arctic Ocean and adjacent waters
- Canadian North (Yukon and Northwest Territories)
- Northern Fennoscandia
- Greenland
- Russian Arctic and Siberia
- Svalbard

Since UDC covers all of the above listed subjects and geographic locations in its classes, it can be easily used in the SPRI Library. The records are maintained in the catalog using the main as well as auxiliary classes of the UDC, which correspond to the subject encompassed by the SPRI Library database. Since 1985, all bibliographic records are entered in the SPRI Library as per the rules of the UDC. The adaptation of the classes and notations of the UDC has made the retrieval and organization of collections in the SPRI Library easy and practical.

Case Study 2—Use of UDC in Internet Services

The UDC is an international scheme that endeavors to cover all areas of knowledge. The original purpose of use of the UDC for ordering and indexing entries in a printed bibliography have since been overtaken by its use for indexing and retrieval in computer-based systems. The scheme consists of 60,000 classes (divisions and sub-divisions) as well as a number of auxiliary tables to describe information related to a wide range of subjects.

At least five Internet services are currently using UDC. These include:

1. **BUBL**: The BUBL Subject Tree aims to give comprehensive coverage of UK Internet resources in all subject areas. The original Subject Tree uses UDC, but it should be noted that BUBL is in the process of transforming intoa new service called LINK that will be using the DDC scheme. BUBL does not classify individual items, but uses the UDC to provide section that can be browsed for each subject area. The depth to which the classification scheme is used varies across the different subjects.
2. **GERHARD**: In the Deutsche Forchungsgemeinschaft (DFG) funded project GERHARD (German Harvest Automated Retrieval and Directory), UDC is used in the enlarged and multilingual version of the ETH library Zürich. The aim of the project is to establish a service for searching and browsing German Internet resources. The documents are gathered by a robot, matched to the UDC entries by computer

linguistic algorithms to create searchable index and an automatically generated Subject Tree. The project started in October 1996 at the university library of Oldenburg.

3. **NISS**: The NISS Directory of Networked Resources is a selective service that covers all subject areas. NISS uses UDC in some detail and browsing. NISS involves working through UDC hierarchies with the numbers displayed on the screen, above each section. The directory may be browsed in UDC number 'inverted tree structure', UDC number linear structure or alphabetical subject heading order. NISS does not normally classify beyond the decimal point, although there are exceptions in the 'computing' and 'geography' sections. UDC Class-marks are added to the directory on an ad hoc basis.
4. **OMNI**: OMNI (Organizing Medical Networked Information) is a selective subject service that catalogs resources relating to medicine. OMNI currently uses UDC to create sections that can be browsed by the users. OMNI finds it difficult to classify with the UDC scheme.
5. **SOSIG**: The Social Science Information Gateway is a selective subject service that catalogs resources relating to the social sciences. SOSIG does not use the UDC in its complete form, but has drawn upon UDC social science classification numbers to create the browsing sections of the service. 26 UDC numbers are currently used for the browsing sections. In cataloging however, a larger list is used—57 numbers have been selected with a view of increasing the number of browsing sections when a suitable number of resources have been placed in the new sections. No other UDC numbers are currently used.

UDC is used in a number of online catalogs, databases and information retrieval packages mainly because it is not language dependent. In addition, UDC is multi-lingual and is available for use in several languages.

The UDC according to Internet services has an advantage in that it is widely used and accepted. UDC is an agreed international standard, which means it is widely recognized, used and available. The structure of the classification allows composite codes to be assigned to provide complex and detailed description of the subject content of a document or resource. UDC is a sizeable and comprehensive classification scheme, which gives it a certain amount of flexibility. UDC can be used in several Internet services in several different precision levels. UDC for Internet services is free to use and none of the services have to pay for UDC, which is counted as a main advantage of the UDC.

The UDC does have some weaknesses as seen by the Internet services. The UDC according to several Internet services is not frequently updated. Internet services that use UDC pointed out that some subjects in the UDC are old-fashioned and outdated. Some Internet services also pointed out that some sections of subjects

have out-grown the main class of UDC that holds them. Internet services also pointed that the UDC was weak in some subjects and complex to use.

9.3.3 Colon Classification

NOTES

Colon classification is the best available systematic scheme of library classification. The colon classification system is used in many libraries in India and a few libraries abroad as well. Colon classification was developed and introduced by late Dr S. R. Ranganathan. The available library classification systems according to Dr S. R. Ranganathan were not flexible enough to allow accommodation of new subjects that evolved with the ever-changing dynamic world of knowledge. According to him, the existing library classification systems were not able to cope up with the new subjects very well. He, thus, went on to develop a new library classification system called colon classification.

Colon classification includes and enumerates all possible subjects and their sub-divisions. The colon classification system analyses the subjects according to their various components, and places them under five fundamental categories known as personality, matter, energy, space and time. The different components of the subject are connected and synthesized using special symbols provided in colon classification.

To build a class number, colon classification analyzes and picks up the possible isolates belonging to different fundamental categories. These are then put together with the help of appropriate connecting symbols to get a unique class number that defines a specific subject.

Colon classification is an Analytico-synthetic scheme of classification. It involves analysis and synthesis of the subjects and their inter-connections. Colon classification is a general scheme for classification of documents. The main aim of colon classification is to classify all kinds of documents—books, periodicals, reports, pamphlets, microforms and electronic media in all kinds of libraries on the basis of the subject of the documents.

Colon classification because of its simplicity and ease of use finds use in several applications and is used in many libraries and institutions to make the task of classification and retrieval of information simple and easy.

Editions of Colon Classification

Colon classification was first published in 1933 and since then several editions have been published. The first edition of colon classification provided and used scheduled diverse facets in each basic class. The colon was introduced as the notational device for synthesis of the classes. Since the use of symbol ':' was an important part of the scheme, the scheme was named colon classification.

The features of the first edition of colon classification (CC1) are as follows:

- Colon classification provided schedules for different facets in each basic class.

- Special schedules for common subdivisions, geographical divisions and language divisions were provided in colon classification.
- The class number could be constructed in colon classification by combining numbers taken from the different facets of the various basic classes.
- CC1 used mixed notation, consisting of capital letters, small letters, Arabic numerals and the colon.
- Decimal fraction notation, as well as octave notation was used in CC1 for the purpose of hospitality in array.
- CC1 made use of eight special devices that included the colon device, geographical device, chronological device, favoured category device, classic device, alphabetical device, subject device and bias number device.
- CC1 provided a new phenomenon for constructing the book number. It also allowed the books having the same class number to be individualized and classified.
- CC1 used the concept of phases. The second edition of colon classification (CC2) was published in 1939. This edition was an improvement of CC1. CC2 made use of the concept of fundamental categories. Fundamental categories included personality, matter, energy, space and time. These categories formed the basis of classification of the documents.

The third edition of colon classification was published in 1950. The third edition was improved to provide a facet formula for each basic class. However, the formula was defined taking into consideration the fundamental categories on the basis of which the classification of documents was carried out.

The fourth edition of colon classification was published in 1952. In this edition, different indicators were introduced apart from the colon. These indicators were used to define different facets that corresponded with the different fundamental categories. The different indicators introduced in the fourth edition are as follows:

- Comma for personality
- Semi-colon for matter
- Colon for energy
- Dot for space
- Dot for time

With the introduction of new indicators, the entire scheme used for document classification needed to be changed and reconstructed. In the fourth edition of colon classification, the concept of fundamental categories was used in a concrete manner. The fourth edition also introduced the concepts of rounds and levels.

NOTES

The fifth edition of colon classification was published in 1957. The fifth edition had all the basic features of its preceding editions. However, the fifth edition of colon classification introduced substantial changes in the rules and in various schedules that were used for the classification of documents.

The sixth edition of colon classification was published in 1960. The sixth edition made various changes in the schedules using which classification was done. The use of Greek symbols was made in the sixth edition. A major change was made to the sixth edition of colon classification. The sixth edition made use of an inverted comma (') instead of dot (.) for the time facet.

The seventh edition of colon classification was published in 1987. This edition of colon classification provides schedule of basic classes. In the seventh edition, common isolates are also listed and so the class numbers are not readily provided, but have to be constructed. The seventh edition of colon classification is an analytic-synthetic scheme for classification of documents.

Main Classes of Colon Classification

In colon classification, no subject or document can exist without a main class. Thus, main class is the central element of colon classification. The main classes of colon classification are as follows:

- **Z:** This class is meant for any publication that deals with several subjects and cannot go into any other single main class.
- **2:** This class deals with documents related to library science. The facet formula for this class is 2[P];[M]:[E][2P] where [P] is the kind of library, [M] is the kind of document under process and [E] Cum [2P] are library techniques, procedures and processes.
- **B:** This class deals with Mathematics. The main class Mathematics is divided into 9 canonical sub-divisions or classes. These are: B1 for Arithmetic, B2 for Algebra, B3 for Analysis, B4 for Other Methods, B5 for Trigonometry, B6 for Geometry, B7 for Mechanics, B8 for Physico-Mathematics and B9 for Astronomy.
- **C:** The main class C deals with Physics and is divided into 8 canonical divisions that are C1 for Fundamentals, C2 for Properties of Matter, C3 for Sound, C4 for Heat, C5 for Light, Radiation, C6 for Electricity, C7 for Magnetism and C8 for Cosmic Hypotheses.
- **D:** this class deals with Engineering. The facet formula for this class is D[P],[P2]:[E][2P] where [P] is the kind of work, [P2] is the part of work, [P3] is the part of work of D6 and [E] cum [2P] are various engineering operations.
- **E:** The main class E deals with documents related to Chemistry. The facet formula for this class is E[P]:[E][2P] where [P] are elements or compounds, organic and inorganic, collectively termed as substance

number, [P2] are organic derivatives and [E] cum [2P] are chemical processes and manipulation.

- **F:** This class deals with Technology. The facet formula for this class is F[P]:[E][2P] where [P] is the substance facet, [E] cum [2P] means the problem facet as well as the process facet.
- **G:** This class is related to Biology. The facet formula for this class is G[P]:[E][2P] where [P] is the kind of life and [E] Cum [2P] is the biological problem of life.
- **H:** The class H refers to documents related to Geology. The class is divided into 8 canonical divisions, which are H1 for Mineralogy, H2 for Petrology, H3 for Structural Geology, H4 for Dynamic Geology, H5 for Stratigraphy, H6 for Paleontology, H7 for Economic Geology and H8 for Cosmic Hypotheses.
- **HZ:** This class deals with Mining. The facet formula for the class is HZ[P],[P2]:[E][2P] where [P] is the ore, [P2} is the part of the work and [E] Cum [2P] are the processes involved in mining.
- **I:** The class I deals with botany. The facet formula is I[P],[2P]:[E][2P] where [P] is the natural group, [P2] is the part or organ of the plant, [E] Cum [2P] denotes the life processes.
- **J:** This class is related to Agriculture and the facet formula is J[P]:[E][2P]:[2E] where [P] is denoted as plants, [E] is the problem isolate, [2P] is denoted by substance, [2E] is denoted by operation isolate.
- **K:** The class K is related to Zoology with the facet formula K[P]:[E][2P] where [P] is the natural group isolate and [E] and [2P] is the problem isolate.
- **KZ:** This class is related to Animal Husbandry. It uses the facet formula KZ [P]:[E][2P]:[2E][3P] where [P] is the kind of animal isolate, [E] is the problem isolate and the techniques of animal husbandry, [2P] is the extension of [E], [2E] and [3P] are the form division.
- **L:** This class deals with Medicine and has the facet formula LP [P]:[E][2P]:[2E][3P] where [P] is the body organ,[E] cum [2P] is the biological problems of human life; working and failure of human machine, [2E] cum [3P] is the prevention or treatment or pathology of diseases.
- **LZ:** This class represents Pharmacognosy and has the facet formula LZ3 [P]:[E][2P]. This main class has been divided into canonical classes: LZ3 for Pharmacology, LZ5 for Pharmacopoeia and LZ8 for Pharmacy.
- **M:** The class M deals with information and documents related with Useful Arts. : This class is related with Spiritualism and the facet formula used for this class is [P],[P2]:[E][2P] where [P] is the kind of religion, the domain of spiritual and mystic experiences, [P2] is the entity isolates

NOTES

or is the agency of experiences, [E] cum [2P] is the problem facet that involves methods, techniques and ultimate results of mystic and occult experiences.

- **N:** This class represents Fine Arts. It is further sub-divided into NA for Architecture, ND for Sculpture, NN for Engraving, NQ for Painting and NR for Music.
- **O:** The main class O is related with Literature. It works on the facet formula O[P],[P2][P3],[P4] where [P] stands for language of the literature, [P2] stands for the form of literature that includes drama, poetry or fiction, [P3] stands for the author facet, [P4] stands for the individual named work of a given author.
- **P:** The main class P deals with documents that contain information related to Linguistics. It uses the facet formula P[P],[P2][P3]:[E][2P] where [P] is the language under study, [P2] is the variant stage, [P3] is the linguistic element whereas [E] cum [2P] are the linguistic problems.
- **Q:** The main class denoted by Q deals with religion. It uses the facet formula Q[P]:[E][2P] where [P] is the religion itself, [E] cum [2P] enlists the religious practices and beliefs.
- **R:** The class R represents Philosophy. It is divided into eight canonical divisions that are R1 for Logic, R2 for Epistemology, R3 for Metaphysics, R4 for Ethics, R5 for Aesthetics, R6 for Favored System(1), R7 for Favored System (2) and R8 for Other Systems.
- **S:** The class S deals with Psychology and has the facet formula S[P]:[E][2P] where [P] is the individual human being and [E] and [2P] enlist psychological activities and processes.
- **T:** The main class T deals with education. It makes use of the facet formula T[P]:[E],[2P],[2P2] where [P] is constituted of various types of educands-the level or kind of students, [E] is constituted of educational techniques or problems, [2P] covers the subject taught, [2P2] enlists methods or physical medium of education.
- **U:** This class deals with Geography and has the facet formula U[P].[S]‘[T].
- **V:** This class deals with History and has a facet formula V[P],[P2]:[E][2P]‘[T] where [P] is the community as distinguished from the geographical area, [P2] is the organ of the government, [E] and [2P] cover the activities, functions and policies of government.
- **W:** The class W deals with Political Science. The facet formula used for classification is W[P][P2]:[E][2P] where [P] is Type of State, [P2] is the organ of the state; [E] cum [2P] cover activities, politics and function of the state.

- **X:** The main class X deals with Economics and its various systems. The facet formula used is [P];[M]:[E][2P] where [P] is business or economic agency, [M] is the medium of currency and [E][2P] is economic problems and activities.
- **Y:** The class Y deals with Sociology by making use of facet formula Y[P]:[E][2P]:[2E][3P] where [P] is the community or social group-isolatesenumerated, [E] and [2P] facet covers activities, traditions, social problems, [2E] and [3P] deals with secondary problems, such as conservation, development and prevention of social ills.
- **Z:** The class Z is related to Law. It makes use of the facet formula Z[P],[P2], [P3],[P4} where [P] is the community over which a given law has the jurisdiction. [P] stands for community and not a subject. [P2] and [P3] are Law I and Law II respectively.

Thus, the colon classification system covers a wide range of subjects and knowledge domains on the basis of which it classifies the various documents. Colon classification defines the main subjects as the main classes and within a main class, several classes can be defined that deal with the various aspects of the subject represented in the main class. Thus, colon classification system focuses on the details of the document rather than the order of the subjects on the basis of which it classifies documents.

Notations used in Colon Classification

Colon classification makes use of a notational system to name classes and to assign numbers to the subjects it classifies. The notational system used consists of 23 Roman small letters (a…z excluding i, l, o), 10 Indo–Arabic numerals (0–9), 26 Roman Capital letters (A–Z), bracketed numbers, indicator digit hyphen (-) and asterisk (*).

Z, 0 (zero) or 9 (nine) represent an empty digit. T, V, X and Z are used as emptying digits but if these appear as the initial digit of the document number or name then they have a semantic meaning associated and are not considered emptying digits. U, W and Y are empty-emptying digit.

Colon classification also makes use of isolates, and the notational system used assigns numbers to the isolates. The notational system makes use of the following to name and number isolates: 10 Indo–Arabic numerals (0–9), 26 Roman capital letters (A–Z), 23 Roman small letters (a–z excluding i, l, o), bracketed numbers and indicator digits * ‘ !) & ‘ . ; , - = + ’! (.

Isolates in Colon Classification

In colon classification, an isolate is the basic unit of knowledge. An isolate cannot stand by itself and, thus, cannot make a main class in colon classification. A common isolate is an isolate that is enumerated only once and remains fixed or same for every main class. Common isolates are attached to a majority of classes but not

NOTES

essentially all classes. Common isolates represent auxiliaries and not a part or concept of a main subject. Common isolates stand for divisions such as encyclopedia, dictionary, periodical, commission report and conference proceeding.

Common isolates can be further divided into anteriorizing common isolates and posteriorizing common isolates. Anteriorizing common isolates are the ones that when attached to a subject give it an anterior position over other subjects of the same class. They are of three kinds: Applicable before Space Facet, Applicable after Space Facet, and Applicable after Time Facet. Posteriorizing common isolates give posterior position to the document to which they are attached. It means a class number fitted with a PCI will come after the same class number without it. Posteriorizing common isolates are of two types: Energy PCI and Personality PCI. Energy PCI are attached with a colon and Personality PCI are attached to any class with a comma.

Advantages and Disadvantages of Colon Classification

Colon classification is an analytical and synthesizing technique of document classification. The system studies the details of the documents to be classified and then accurately tries to classify the document. Colon classification has the following advantages:

- Colon classification system uses a sound theory for classification of documents and so can be used to classify any document related to any subject.
- The notations used in colon classification are easy to use and understand and so a unique number can be assigned to practically every document or subject, which is classified using this system of document classification.
- Since colon classification uses analysis and synthesis of the documents to be classified, the system is able to provide a helpful order for the classes it contains. This factor also makes it possible to locate any topic or subject whether it is simple, complex or compound.
- Since colon classification is easy to use and understand, it can easily be used in an online or computer-based document finding system to locate and retrieve information in an accurate manner.

Colon classification is used in several libraries especially in India. Though its implementation is successful, there are a few drawbacks of colon classification system. The disadvantages of colon classification are as follows:

- There is no provision for revision of colon classification classes and subjects. There is no machinery or a centralized institution that manages colon classification and so revision work in this case is not possible.
- A few editions of colon classification lack guidance and clarity in some areas and so make the classification ambiguous.

NOTES

- Colon classification rules are not easy to understand. One needs a manual to apply the rules for classification of documents and also for retrieval of accurate information.
- Colon classification is not considered simple and cannot be used by novice users as it is not user friendly.

Implementation of Colon Classification—Case Study

The following case study discuss the implementation of colon classification:

Case Study —Colon classification as used in Central University of Tibetan Studies

The acquisition and technical processing section of the Central University of Tibetan Studies library is responsible for the acquisition and technical processing of the information resource, acquired in accordance with the acquisition policy of the library and requisitions of learned faculty members. The section also receives books on approval from different suppliers and organizes meetings of the books' selection committee to get the purchase recommendations.

The library follows colon classification 6th ed. for subject classification of printed documents and AACR2 for cataloguing of the documents.

The library houses:

- All types of documents in Tibetan language in any subject irrespective of forms
- Documents in any language dealing with the subjects of Buddhology, Tibetology, Philosophy, Religion, Culture, History, Geography, Arts, Anthropology and allied subjects having direct bearing on Tibetology and Buddhology
- Documents of English, Hindi and related languages on the subjects of Himalayan Studies, Indology, Mongolian Studies and Sinology
- Documents of Sanskrit language and literature
- Important reference materials and popular books
- Documents relating to Library and Information Science
- Academic course materials to support the curriculum of the institute

The Technical Section of the Shantarakshita Library is responsible for the technical processing of printed and non-print documents other than Serial and Tibetan language. The library follows Dr S. R. Ranganathan's colon classification, 6th ed., for subject classification of the printed documents and AACR2, 1978 for cataloging of all type of documents. The multi-lingual library database having bibliographical details in Tibetan, Devanagari and Roman Scripts is accessible from any computer node of the University's network and also from university Website. The library has successfully used colon classification for the use of effective

cataloging. The organization of the library materials has become easy for the library and also the access and retrieval time has been improved significantly.

NOTES

Check Your Progress

1. What is Dewey Decimal Classification?
2. What is Universal Decimal Classification?
3. What type of information do auxiliary tables of the UDC contain?
4. What do main tables of UDC contain?
5. What is UDC notation?

9.4 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. Dewey Ddecimal Classification (DDC) is a proprietary-based library classification system, published in 1876.
2. Universal Decimal Classification (UDC) is a bibliographical and library classification system, developed by Paul Otlet and Henri La Fontaine.
3. The auxiliary tables of the UDC contain generalized concepts. These tables contain concepts common to a large number of classes.
4. The main classes or tables of UDC contain various disciplines and branches of knowledge. These tables are numbered 0–9 in the UDC.
5. UDC notation is a combination of symbols, numerals, signs and letters used to represent a class.

9.5 SUMMARY

- The evolution of any subjects is based on principles similarly the subject of library classification is based on principles. This principle provides a scientific base to the library classification.
- Various library classification systems used are DDC, UDC and colon classification. While DDC and UDC are applied in libraries in America and other libraries across the globe, the colon classification system is more popular in Indian libraries.
- The basic concept and principles of document classification used by these systems is the same. The various domains of knowledge or the various subjects are divided into classes, which are further sub-divided into more specific classes.

- These systems use a specific notation for each document or item that they classify. This number is unique for each record and can be used for the retrieval of the required information as and when required.
- The library classification systems cover a wide area and domain of knowledge. Each of these systems has its own rules and notations to describe a library material.
- The above-mentioned systems usually maintain an alphabetic record of the materials they classify. These systems are easy to use and learn and can be effectively used for the retrieval of information.
- One of the main advantages of these systems is that these are continually reviewed and revised so as to make place for new areas and subjects of knowledge.
- This means that all the information described by any of these systems is current and that these systems are flexible enough to be implemented in any library.

9.6 KEY WORDS

- **Decimal Point:** It is the dot that follows the third digit in a DDC or UDC number.
- **Facet Indicator:** It is a digit used to introduce notation representing a characteristic of the subject.
- **Including Note:** It is a note enumerating topics that are logically part of the class but are less extensive in scope than the concept represented by the class number.

9.7 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions

1. Write a short note on the universal decimal classification.
2. Identify the nine classes of the universal decimal classification.
3. What are the common auxiliaries used in the universal decimal classification?
4. State the commonly used signs in the universal decimal classification.
5. List the principles of universal decimal classification.
6. Briefly describe colon classification. List the notations used in colon classification.

NOTES

Long Answer Questions

1. What type of information is displayed by a record in universal document classification? Give examples.
2. Discuss the features of universal decimal classification.
3. What are the merits and demerits of the following:
   (a) Universal decimal classification
   (b) Colon classification
4. Explain the various editions of colon classification. Also, describe the various classes used in colon classification.

9.8 FURTHER READINGS

Parkhi, RS. 1960. *Library Classification: Evolution and Dynamic Theory*. Bombay: Asia Publishing House.

Raju A. 1991. *Universal Decimal Classification.* Madras: T.R. Publishers.

Ranganathan SR. 1963. *Colon Classification*. Sixth Edition. Bombay: Asia Publishing House.

Ranganathan, SR. 1965. *Prolegomena to Library Classification,* Second Edition. London: Library Association.

UNIT 10 ENUMERATIVE AND ANALYTICO-SYNTHETIC SCHEMES: A COMPARATIVE STUDY

Structure

10.0 INTRODUCTION

In the previous unit, you were introduced to the different schemes of library classification and their historical development. The unit also undertook a comparative study of Dewey Decimal Classification (DDC), Colon Classification (CC) and Universal Decimal Classification (UDC). To recapitulate, DDC comprised of 10 Main Classes with 9 sub-classes and 9 sub classes of each sub class, i.e., beginning with most general subjects to more specific ones. In CC, the main classes are comprised of Generalia (1 to 9) and 26 Main Classes (A to Z) of both Science and Humanities. The first 13 classes comprise the Science and applications and the last 13 comprises of Humanities. In UDC, the scheme follows DDC except addition of some new sub-divisions and signs of combination for indication of relation of subjects. In terms of form division, DDC uses a series of nine common form divisions and these with minor alternatives are used with same meaning throughout the scheme. In UDC, form divisions (01-09) retain the original Dewey significance but have been redefined and greatly expanded. While in CC, common sub-divisions use of lower case letters with decimal sub-divisions where necessary.

An enumerative library classification scheme is a scheme where all the possible classes are enumerated according to certain characteristics. The Analytico-Synthetic Scheme, according to Ranganathan "is used to denote any scheme in which a compound subject is first analysed into its facets in the idea plane and in the notational plane respectively."

In this unit, you will learn about the enumerative classification scheme as well as the analytical-synthetic scheme. Moreover, the unit will also present a comparative analysis of the two schemes.

NOTES

10.1 OBJECTIVES

After going through this unit, you will be able to:

- Define the enumerative classification scheme
- List the features of the enumerative classification scheme
- Prepare a comparative study of the enumerative classification scheme and the analytico-synthetic scheme

10.2 ENUMERATIVE CLASSIFICATION SCHEME

Let us study the meaning and definition of the enumerative classification scheme.

According to Dr Ranganathan: "In the enumerative classification scheme in the solitary schedule in which are included all the possible subjects of the past, present and future."

According to B.C. Vickery: "In the enumerative classification scheme, all the possible subjects are inscribed."

This scheme is, thus, as old as the subject classification. All the subjects enumerated in the schedule of this scheme, most of which are simple, are provided the readymade class numbers, and they are systematically arranged in the order of precedence.

Characteristics

These are as follows:

1. **Readymade Class Number:** The schedule of this scheme contains readymade numbers. In the first column, the class numbers are listed serially, and the second column contains their meanings in the natural language. The classifier, this way, gets a great help from the readymade class numbers.
2. **Relative Index:** The availability of relative indexs is the main characteristic of the enumerative classification scheme. In the index, all the subjects related to a term are arranged alphabetically underneath that term, and their class numbers are given in front of those subjects. This way, a classifier gets a great help from this index to search his desired subjects.
3. In this scheme no class number can be given to a specific subject. Its schedules are comprehensive, but the description of the specific subject is very limited.

4. In the class numbers formed under this scheme, there is a mention of all the possible subjects keeping in view the past, present and future, but it is possible to accommodate new subjects.
5. In this scheme, there is a lack of flexibility in array and chain.
6. Pure notations used in this scheme, and mixed notation is lacking, therefore, there is no provision for method.
7. There is a lack of analysis and synthesis in this scheme.
8. Due to the use of readymade class numbers in this scheme, there is no freedom to the classifier who cannot form class numbers independently.
9. This scheme is nearly suitable.

10.3 ANALYTICO-SYNTHETIC SCHEME

Let us study the meaning and definition of the analytico-synthetic scheme.

According to **Vickery**: "In this scheme, each basic term is converted into classification signs, and the subject is represented through such collected signs."

According to **J. Mice**: "This schemes is first of all analysed into facets, and therefore, the class numbers are formed through synthesis."

Under this scheme, a collective subject is first of all analysed into facets at the ideological level, thereafter, it is converted at the verbal level, and at the notation level, these are synthesized with each other with help of various connecting signs. We can explain this with the help of an example as that a child has various parts of a toy in various colours. The child wants to assemble the models of various animals. He will first of all form the structure of the animal in his mind, and thereafter, he will assemble the model with the help of these parts.

In the analytic-synthetic scheme, a specific subject is analysed into its phases, facet, and isolates and, thereafter, the class number of the subject is formed with the help of the connecting signs.

10.3.1 Difference between Both Classification Schemes

The difference between the two classification schemes can be explained through the medium of the following points:

1. **One-pillar and Numerous:** The index of enumerative scheme is one-pillared, whereas the schedule of analytico-synthetic scheme is numerous.
2. **Index:** In the enumerative scheme, index is given special importance, whereas there is no importance of index under the analytic-synthetic scheme, a classifier enjoys unlimited autonomy under the analytico-synthetic scheme.
3. **Hospitality:** There is no provision for the devices under the enumerative classification scheme because the base of the notation is limited, due to

which there is no hospitality in array and chain, whereas, there is infinite hospitality under the analytico-synthetic classification scheme.

4. **Scientific method:** The process of analytico-synthetic scheme is scientific because it is based on rules, sub-rules and postulates. In the enumerative scheme, there is no such provision. Under the enumerative scheme, crude class numbers are formed, where intensive classification is possible under the analytco-synthetic scheme.

10.4 DIFFERENT DEVICES

Consecutive development is the characteristic of universe of knowledge. This is a problem for any classification scheme because forming of classification schemes takes its time, and there could be provision for the subjects known till that time. On the other hand, the research of knowledge is a continuous process because of which the development of knowledge is rapidly spreading in all the directions. Consequently, new ideas and new subjects are being formed rapidly. It is necessary for a good classification scheme to provide appropriate space for the new subjects, and the anticipated future subjects without disturbing the present sequence of the subjects. In such circumstances, only that classification scheme could be successful, in which the arrays or chains of classes or isolates have infinite flexibility, which implies that the isolates present in the arrays of any facet, should be made more abstruse by dividing, and new isolates should be formed without making any changes in the determined sequence. To fulfill this objective, a provision is made in all the classification schemes, which enhances the flexibility of classes and isolates.

This way, the provision of devices in a classification scheme implies, to enhance the capacity of the array isolates and chain isolates to accommodate the new isolate ideas.

Aims

This type of provision made in any classification scheme, has the following aims of devices:

(i) To achieve infinite flexibility in the arrays and chains of the classes and facets.

(ii) The use of devices eliminates the necessity for enumeration of the various classes, consequently, the size of the schedules can be reduced.

(iii) To provide autonomy to the classifier, in that, a classifier can form isolate digits with the help of the devices.

(iv) To maintain helpful sequence in the classification scheme by using these devices.

(v) To make the existing isolates more advanced with the help of the devices.

This way, with the help of the devices (i) new isolate can be formed in the class array, and the literal meaning of the existing isolates can be made more sharp (ii) the advantage of infinite hospitality in array and chain can be created.

NOTES

10.4.1 Variety of Devices

The devices used in any classification scheme are as follows:

1. **The devices for fabricating new isolates and for sharpening the literal meaning of the existing isolates:**
   - (a) Alphabetical Devices
   - (b) Chronological Devices
   - (c) Geographical Devices
   - (d) Subject Devices
   - (e) Enumerative Devices
2. **Devices for acquiring hospitality in array:**
   - (a) *Extrapolation:*
     - (i) Agglomeration Devices
     - (ii) Common Isolate Device
     - (iii) Gap Device
     - (iv) Mixed Base Device
     - (v) Sector Device
   - (b) *Interpolation:*
     - (i) Gap Device
     - (ii) Mixed Base Device
     - (iii) new Digit Device
3. **Devices for acquiring hospitality in chain:**
   - (a) *Extrapolation:*
     - (i) Decimal Fraction devices
     - (ii) Gap Device
     - (iii) Mixed Base Device
   - (b) *Interpolation:*
     - (i) Synthesis Device
     - (ii) Gap Device
     - (iii) Mixed Device

Here, we will describe the symbolic numbers used in the colon classification scheme and the universal classification scheme.

(I) Universal Decimal Classification Scheme

In this classification, there is a vast provision of the symbolic signs. Due to this provision, it is capable to make class numbers of the other collective and complicated

NOTES

subjects in addition to the pre-determined class numbers. This scheme is, therefore, called approximate faceted classification scheme.

The symbolic signs used in the Universal Decimal Classification Scheme are as follows:

1. Plus sign (+): Using this symbolic sign, two uneven class numbers are joined together.

   Example: Astrology and Physics

   S2 + 53

2. Oblique (/): This type of the symbolic sign is used to join the consecutive class number.

   Example: Christianity 22/28

3. Colon (:): The colon is used to join the two class numbers of similar thought process.

   Example: Statistics for Physics

   311 : 53

4. Apostrophe (‘): It has been mostly used for 546 and 547

   Example: Sodium-Halogens Compounds

   546.33’12

5. Quotation signs (“ ”): These signs are used to show the period.

   Example: 15th August, 1947

   624-78

6. Hyphen (-): This type of symbolic signs are used to show the geographical areas and special helpful subdivisions.

   Example: Safety in civil Engineering

   624-78

7. Equal to sing within the parenthesis (=): These are used to show the race and nationality aspects.
8. Parenthesis ( ): These are used for place.

   Example: Public Library Services in India

   026 (540)

9. Zero within parenthesis (0): These are used to present the physical form.
10. Equal to sign (=): Used for the language auxiliaries.
11. Twin colons (::): Its limited use is made to show the subordination.

    Example: Scientific Education :: 37

(II) Use of Indicator Digit in Colon Classification

The following symbolic signs are used in the colon classification scheme:

1. Comma (,): In this scheme comma is used to show the personality facet.
   Example: Hindi poetry
   0152, 1
2. Semicolon (;): It is used to show the matter facet.
   Example: Classification of Periodicals in Public Library
   22: 51
3. Colon (:): It is used to show energy facet.
   Example: Classification of Public Library
   22: 51
4. Hyphen (-): It is used for the super imposition method.
   Example: Rural Women
   Y15-31
5. Forward Arrow: These symbolic signs are used to show the future of the documents.
   Example: Future of Library Science in India
   2.44'M →
6. Dot (.): It is used to show the place facet.
   Example: Education in India
   T.44
7. Single Quotation mark ('): It is used to show the period facet.
   Example: Teaching of Botany
   T.3 (1) 'M98
8. Zero (0): It shows phase relation.
   Example: Botany for Physics
   10bC
9. Backward Arrow (\): It is used to show special expansion.
   Example: History of India 1875-1947
   V44'M47 ← M75
10. Parenthesis [( )]: These signs are used for the subject scheme.
    Example: Wheat industry
    x8(J382)

NOTES

It is clear from the above description that the success of the classification scheme depends on the use of symbolic signs.

Check Your Progress

1. List two characteristics of the enumerative classification scheme.
2. State one feature of the universe of knowledge.

10.5 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. Two characteristics of the enumerative classification scheme are the following:
   (i) Readymade class number
   (ii) Relative index
2. Consecutive development is the characteristic feature of the universe of knowledge.

10.6 SUMMARY

- All the subjects enumerated in the schedule of the enumerative classification scheme, most of which are simple, are provided the readymade class numbers, and they are systematically arranged in the order of precedence.
- In the Analytic-Synthetic Scheme, a specific subject is analysed into its phases, facet, and isolates and, thereafter, the class number of the subject is formed with the help of the connecting signs.
- The index of enumerative scheme is one-pillared, whereas the schedule of analytico-synthetic scheme is numerous.
- Consecutive development is the characteristic of universe of knowledge. This is a problem for any classification scheme because forming of classification schemes takes its time, and there could be provision for the subjects known till that time.

10.7 KEY WORDS

- **Interpolation:** It is the estimation of a value or set of values based on their context.
- **Extrapolation:** It is the statistical technique of inferring unknown from the known.

10.8 SELF ASSESSMENT QUESTIONS AND EXERCISES

NOTES

Short Answer Questions

1. Define the enumerative classification scheme.
2. Mention the symbolic signs used in colon classification scheme.

Long Answer Questions

1. Differentiate between the enumerative classification scheme and the analytic-synthetic scheme.
2. What are the variety of devices used in a classification scheme?

10.9 FURTHER READINGS

Parkhi, RS. 1960. *Library Classification: Evolution and Dynamic Theory*. Bombay: Asia Publishing House.

Raju A. 1991. *Universal Decimal Classification.* Madras: T.R. Publishers.

Ranganathan SR. 1963. *Colon Classification*. Sixth Edition. Bombay: Asia Publishing House.

Ranganathan, SR. 1965. *Prolegomena to Library Classification,* Second Edition. London: Library Association.

NOTES

UNIT 11 CALL NUMBER, CLASS NUMBER AND BOOK NUMBER

Structure

11.0 INTRODUCTION

Libraries use the Library of Congress Classification System (LC) to organize materials. Every item in our collection is assigned a unique call number, or address based on the subject and publication details. Library materials are shelved in call number order, and other titles on a similar topic will be shelved nearby.

The first line will tell you if the book is located in a specific collection area in the library. REF indicates that the book is shelved in the Reference section. 2nd line: Most call numbers begin with one or two letters. The first letter represents the major division or "class" within LC. Ex. Q = Science. The second letter represents a subdivision within the class. Ex. QH = Natural history (general).

In some areas of LC, call numbers begin with three letters. Read this line in alphabetical order. Single letters are filed before double letters. Ex. Q is shelved before QH, and QH is shelved before QR. 3rd line: The first set of numbers represent the book's subject. Ex. 442.2 = books on cloning. Read this line as a whole number. Ex. QH 442.2 is shelved before QH 443. 4th line: After this number, you will see a letter called "the Cutter" which represents the first initial of either the

authors last name, the organization, or the title of the book. Some books may have 2 "Cutters" (the first Cutter is often a further refinement of the subject matter, followed by the 2nd Cutter which represents the author, organization, or title). When reading this part of the call number, you read the letter alphabetically then read the following number as a decimal. Hint: After the letter, smaller first, second, and third (and so forth) digits are shelved before larger ones. Examples: .C66 is shelved before .C67 and .C66 is shelved before .C8 Last lines: Will include the publication date, volume or copy number, and/or other annotation.

To be able to efficiently read Library of Congress (LC) call numbers is quite a skill. In this unit, you will study about call number, class number, book number, collection number and construction of class numbers.

11.1 OBJECTIVES

After going through this unit, you will be able to:

- Define call number, book number and collection number
- Explain the construction of class numbers

11.2 CALL NUMBER

Let us start with a sample call number: QE534.2.B64

Call numbers can begin with one, two, or three letters.

The first letter of a call number represents one of the 21 major divisions of the LC System. In the example, the subject "Q" is Science. The second letter "E" represents a subdivision of the sciences, Geology. All books in the QE's are primarily about Geology. Books in categories E, United States History, and F, Local U.S. History and American History, do not have a second letter (exception: in Canada, FC is used for Canadian history). Books about Law, K's, can have three letters, such as KFH, Law of Hawaii. Some areas of history (D) also have three-letter call numbers. Most other subject areas will have call numbers beginning with one or two letters.

For most of the subject areas, the single letter represents books of a general nature for that subject area (for example, Q - General Science or D - General World History).

Numbers after letters

The first set of numbers in a call number help to define a book's subject. "534.2" in the example teaches us more about the book's subject. The range QE 500-625 are books about "Dyamic and Structural Geology." Books with call numbers QE534.2 are specifically "Earthquakes, Seismology - General Works - 1970 to present" One of the most frequently used number in call numbers is "1" which is often used for general periodicals in a given subject area. For example, Q1.S3 is

NOTES

the call number for the journal Science. Journals are also given call numbers based on the specific subject. For example, QE531.E32 is the call number for the journal *Earthquake Spectra* as QE531 is the class number for periodicals about "Earthquakes, Seismology"

11.2.1 Library of Congress (LC) Classification and Call Numbers

Books and scores in the UCB Music Library are organized on the shelves according to Library of Congress (LC) Classification. LC Classification was originally designed to sort books at the Library of Congress and developed specifically with reference to the published literature in each subject area in that collection. Today, it is used widely to organize collections in American academic and research libraries.

The basic outline of LC classification divides the entire field of knowledge into main classes that correspond largely to academic disciplines or areas of study. Main classes are denoted by single capital letters:

A	generalities	M	music
B	phil., psych., religion	N	fine arts
C	auxiliary sciences of history	P	philology and literature
D	history, general/old world	Q	science
E-F	history, America	R	medicine
G	geography, anthropology	S	agriculture
H	social sciences	T	technology
J	political science	U	military science
K	law	V	naval science
L	education	Z	bibliography, library science

The main classes are in turn divided into subclasses, designated by double or triple capital letters, representing branches of the major disciplines. The outline of the individual classes have been developed separately for each subject area. Class M, Music, for example, was first published in 1902 and consists of three principal parts: **M** Music, **ML** Literature on Music, and **MT** Musical Instruction and Study, largely the work of Oscar G. Sonneck, Chief of the Division of Music at the Library of Congress. Nevertheless, the various classes are unified by a number of principles, most notably in the patterned structure of the notation, or call numbers, used to identify each class and the individual items within each class.

11.2.2 Elements of a Call Number

Each book or score in the Music Library is uniquely identified by a set of letters and numerals known as a call number (sometimes also called a shelf mark). Call numbers generally consist of two or three elements: an LC class number followed by a tag known as the Cutter number (or book number) and often a date.

Call number = class number + Cutter number(s) (+ date)

The class number begins with one or more capital letters representing a branch of a subject classification in LC, the broad neighbourhood of items related by subject, discussed above. Within each main class or subclass, the integers 1-9999 (some with decimal extensions) are added to identify further subject subdivisions, defining the subject matter of the item more finely. The same combination of letter(s) and numerals is given to all individual items in the same subject class area.

After the first combination of letter(s) and numerals identifying the subject class another combination follows, known as the Cutter number. Named after Charles A. Cutter, who developed an alphanumeric code that forms the basis of the number, this second letter/number combination places an individual item in alphabetical order within its LC subject class (usually by the first letter of an author's last name, though it may sometimes also represent some other information about a work such as a further subject subdivision). In order to assure the Cutter number is unique a date often follows. Thus, the two parts of the call number serve two very different functions: the first part (class number) organizes knowledge by subject and the second part (Cutter number[s] + date) acts as a shelving device for arranging individual items within subject classes.

For example, the following item from the Music Library:

Moroney, Davitt. *Bach: An Extraordinary Life*. (London: Associated Board of the Royal Schools of Music, 2000) has been assigned the call number ML410.B1.M67 2000, where ML410 is the LC class number and .B1.M67 are the Cutter numbers.

	ML410	class number +
call number =	.B1 .M67	Cutter number(s) +
	2000	date

The meaning of the LC call number can be analysed part by part:

ML410 is the classification for composer biographies: ML represents Music Literature, a subclass of class M Music. The number 410, which is added to ML, represents Biography (by composer last name), itself a subdivision of the group of numbers representing History and Criticism under Music Literature.

The remainder of the notation, .B1 .M67 2000, is added to the class number in order to distinguish the specific item by Davitt Moroney from all other items within the class of items at ML410. In this case, .B1 .M67 is a "double cutter," where .B1 may be seen to form part of the class number, or an extension of it, because it is a subdivision of Biography referring to books on J.S. Bach. Since all biographies of J.S. Bach are given the number ML410.B1, a second Cutter, .M67, is added to refer specifically to Moroney's biography of Bach. Together, the class number and the book number form a unique call number—an address that communicates information about the subject of an item and where a specific item may be found within (an alphabetical list of similar items in) its subject class.

In using a call number to locate a book on the shelf, consider each component of the call number in turn before moving on to the next segment. Each element of

NOTES

the call number is read in a different manner—the class letters alphabetically, the class number as a whole number (with possible decimal extension), and the Cutter as a decimal. For example, the following call numbers are in the order they should appear on the shelves:

M 1 .D15 1990	ML 881 .D2 1988	ML 881 .D2 1993	MT 1 .D15	MT 76 .D29 v.2	MT 76 .D4 v.1

11.2.3 Difference between Accession Number, Book Number and Call Number

Let us now study the difference between various numbers.

Accession Number

An accession number, also known as a catalogue number, is a unique number given to each new item that is acquired by a library. The numbers are typically in sequential order, and are not used usually more than once, even if an item is removed or replaced within the collection, regardless of whether or not there is already an identical copy of the item in the library's holdings. As such, an accession number is helpful in distinguishing multiple copies of the same book, as well as different volumes (or editions) of the same title.

Book Number

Book numbers are parts of call numbers, together with collection numbers and class numbers. Book numbers come at the end, and arrange books about the same subject so that they can be given useful order on the shelf and a unique location in the collection. The collection number, if used, indicates a major grouping within a library or library system, for example, REF for reference or J for the juvenile collection. The class number of a book tells what it is about, but many books can be about the same thing and share the same class number. Book numbers are different for each book having the same class number and will make the full call number completely individual. Just as different classification schemes lead to different class numbers, so do the different book number systems lead to incompatible book numbers.

Call Number

A call number is a unique code that has been assigned by a cataloguer to an item and that is affixed to both the inside and outside of the item. This number is used in the bibliographic record for that specific item, it identifies which copy it is (particularly when more than one copy of an identical book is present), and it indicates the relative location of the item on the shelf.

Usually, a call number is created by using the classification number (from either the Library of Congress Classification System or the Dewey Decimal System) for the title, followed by additional information to indicate such things as publication date, volume number, copy number, and/or location symbol.

NOTES

Cutter Number

The Cutter number is a coded representation of the author or organization's name or the title of the work (also known as the "Main Entry" in library-lingo). Charles Ammi Cutter, a prominent figure in the development of library science, first developed Cutter numbers using a two-number table. Cutter is known for his immense contribution in developing the Cutter Expansive Classification system. A three-number table was developed in 1969. In our above example, QE534.2.B64, the B64 is taken from the two-number table and represents the author's last name, Bruce A. Bolt. The book is Earthquakes. Some books have two Cutters, the first one is usually a further breakdown of the subject matter. For example, QA 76.76 H94 M88 is a book located in the Mathematics section of the Q's. QA 76 is about Computer Science. The ".76" indicates Special Topics in Automation. "H94" tells us that this is a book about HTML. "M88" represents the last name of the first author listed last name, Musciano.

11.3 BOOK NUMBERS

Book numbers (also called item numbers) combine with collection numbers and class numbers to form call numbers. Book numbers are a way of organizing and ordering books about the same subject that share the same class number. They collocate books on the shelf in a helpful manner and provide unique call numbers for every item in the collection. Book numbers are a minor but important part of classification and cataloguing. Brief surveys are made of their history, Cutter and Cutter-Sanborn tables, alphabetical and chronological orderings, Ranganathan's faceted book numbers, and Library of Congress call numbers.

The library of the Faculty of Information Studies at the University of Toronto (at which copies of all the books in the bibliography can be found) uses the Dewey Decimal Classification (DDC). Their policy for making book numbers is to make an author number from the main entry, then add a title mark equal to the first letter of the title (personal conversation with Joseph Cox, 1 February 2003). For example, Satija and Comaromi (1992) has the call number **025.428 S2523B MC**. MC is the collection number, indicating in which of the many campus libraries it can be found. (The name has since changed, which is confusing.) 025.428 is the class number, indicating the subject is shelf listing. There are many books in the library about shelf listing. How to tell them apart? With a book number: for this book, S2523B. S2523 is from Satija, and B is from *Book Numbers*. A Library of Congress (LC) example is a copy of *David Copperfield* by Charles Dickens, found in the main University of Toronto library at **PR 4558.A1 1947 ROBA 1**. PR 4558 is class number, and stands for *David Copperfield*, while A1 indicates that copies are arranged in chronological order and 1947 is the year of this particular edition. The library has appended its own collection mark (ROBA) and a copy number. S.R. Ranganathan devised his own, very detailed, faceted

NOTES

book number system, and in *Colon Classification* (1964), he helpfully includes a complete call number on the copyright page: **2:51N3 qN60**. 2:51N3 is the class number (2 for Library Science, 51 for Generalia Bibliography/Technical Treatment/ Classification, N3 for Colon Classification), and qN60 is the book number (q to show the form is "Code," N for 1900-1999, 60 to make the year 1960).

"Book number" means slightly different things to different people. Comaromi (1981) says a book number is a "combination of author numbers, Cutter numbers, author letters, and any other shelf listing device." Chan (1994) defines item number as "[t]hat part of a call number which designates a specific individual item within its class." Sartap and Comaromi (1992) say, "Class numbers alone produce groupings whose size depends upon the depth of the library classification and the closeness with which the classification used is applied. To organize or provide order within a class grouping, documents are given a further notation called a book number." Ranganathan (1964) said the book number "of a book is a symbol used to fix position relatively to the other books having the same Ultimate Class.... The Book Number of a book individualises it among the books sharing the same class number."

Book numbers do not usually reflect the subject of a book, but instead are based on external attributes such as author name or year of publication. Satija and Comaromi (1992) say that book numbers "may be based on one or a combination of some of the attributes of the document, such as author, title, language, year or place of publication, physical size, and physical make-up." (Book numbers may sometimes reflect a subject-related aspect of a book, such as when it is a volume of criticism. Ranganathan used a gat end of the call number for that and that the Library of Congress system uses its own indicators in some cases. This brings together on the shelf books and their criticism, a very helpful collocation.) Ranganathan (1964) said the book number "may consist of one or more the following successive Facets: Language Number; Form Number; Year Number; Accession Part of Book Number; Volume Number; Supplement Number; Copy Number; Criticism Number; and Accession Part of Criticism Number."

In general, book number = author number + title (or work) mark + edition mark + date of publication + volume number + copy number + anything else library policy dictates. Call number = class number + book number, with the collection number at the start or end.

Why are they needed?

Book numbers give a unique shelf location to each book in a collection. They bring a defined and consistent order to all books on a given topic, an order that may apply more generally to all subject groupings in the library. Depending on the size of the collection and the depth of classification, it may happen that very rarely

[1] "Numbers" in this sense are also called "marks:" book marks, class marks, collection marks, etc. Book numbers are sometimes called item numbers, to cover other forms of material, but here the focus will be on books and shelves.)

do two books collide and share a class number, so book numbers are not thought necessary. Satija and Agriwal (1990) forcefully object to such imprecision:

> For a rigorously fine arrangement of books, book numbers are indispensable. Yet their value is debated if not totally doubted. A sizeable number of librarians do not value them highly in shelf arrangement, no wonder then if these are meted out a step-motherly treatment in some libraries. Literature on them is thin and rare. Even those who use book numbers think of them as merely and adjunct—a tool of the perfectionist only. Yet their value in impeccable shelf classification cannot be underestimated. In close access libraries these have comparatively more value in pinpointing the location of books. And for collocation of host and associated books, and to bring together a book and its sequels, the book numbers are quite indispensable. Their utility and importance becomes more pronounced libraries using broad classification such as Rider's International Classification or even the DDC. It is not to suggest that in use with depth classification systems these are less desired. Whatever be the size of the library and the kind of classification used, book numbers add [the] last touch to the ultimate shelf arrangement.

In 1937, Bertha Barden listed six important reasons for using book numbers (though barcodes have made numbers four and six less relevant now):

> [B]ook numbers in addition to class numbers are needed:
>
> (i) To arrange books in order on the shelves.
>
> (ii) To provide a brief and accurate call number for each book.
>
> (iii) To locate a particular book on the shelf.
>
> (iv) To provide a symbol for charging books to borrowers.
>
> (v) To facilitate the return of books on the shelves.
>
> (vi) To assist in quick identification of a book when inventories are taken.

Broad classifications will make many books share the same class number. Deep classifications will mean fewer do. Some libraries, such as in elementary schools, may use very broad classifications, perhaps Dewey to the tens. What happens when books collide? Ordering the books alphabetically by author's last name (the most basic of book numbers, though perhaps an invisible one if the name is only on the book cover and not on the spine label) seems obvious. For some collections this is enough. It will not be enough in large or specialized libraries or any library where precision and detail are valued, in order that the needs of both the librarian who organizes material, and the user who searches for it, are best served.

11.3.1 Early History

Before the DDC, books had fixed locations on the shelf. Call numbers identified where on which particular shelf a book could be found. Books might be grouped by subject, but new books were added at the end of a shelf, not mixed in. Melvil Dewey introduced relative location: his call numbers tell what a book is about, and

NOTES

organize the books "in terms of their relationship to one another without regard to the shelves or rooms where they are placed" (Chan 1994). When a new book comes in, it can be placed between two existing books. One small effect of Dewey's work was the need for book numbers because two books could now share the same class number. Dewey first tried using the author's full name, but then switched to accession numbers, ordering books by their arrival in the library: "3428.3 and 3428.28 were respectively the third and twenty-eighth books in the child care class" (Comaromi 1981). This might bring a rough chronological ordering, but it was not good enough.

11.3.2 Cutter and Sanborn

Making rules for book numbers was a busy field in the late 19th century (Lehnus 1980, Comaromi 1981). Several schemes were devised, some using author names and some using publication date. One man's work has survived: Charles Cutter. The two- and three-figure Cutter tables and the Cutter-Sanborn table are the basis for modern author numbers, and "to cutter" is a common expression when cataloguing.

Cutter began turning author names into letter-number combinations in 1879, first published about it in 1880, and by the mid-1880s, after several editions and with Dewey's imprimatur, his system had become common (Satija and Comaromi 1992). The rules are neatly specified: "Use one letter for words beginning with consonants (except S), two for words beginning with vowels or with S, three for words beginning with Sc" (Cutter n.d.). For example, to turn Denton into an author number, go to the fragment on the table that precedes it alphabetically: "Deno 43." If there are no other names in the Deno-Dent range already, then Denton would become D43. If Denovich had already claimed D43, Denton could become D435, leaving room for 431-434 to be used for other nearby names. The numbers are to be treated as decimal fractions, as in the DDC. Bruce Sterling would become St4, Albert Einstein Ei6, and Joseph Schumpeter Sch8. The three-figure table, which published in 1901 after Kate Sanborn's work, is an extension of compatible with the two-figure table, and is suitable for larger libraries (Comaromi 1981).

Kate Sanborn (later Jones) was asked by Cutter to revise the two-figure table but ended up making a new table that was incompatible. Author numbers would be one letter plus one to three letters. The distribution of numbers through the letters of the alphabet was different from Cutter's original work. Her table of name fragments and numbers was large, with more than 12,000 numbers, but Cutter's later three-figure table was larger still, with more than 20,000 (Lehnus 1980).

Cutter also included instructions for complete book numbers: one could add title marks based on the first one or two letters of the title to distinguish different books by the same writer; copy numbers could be indicated with a 2 or 3; translations could be marked with the initial letter of the language of origin; biographies would be filed by subject but with an additional letter to show the writer; commentaries would add a -Y; dictionaries and concordances would add a -Z (Cutter and Jones n.d.).

The Cutter and Cutter-Sanborn tables are still popular, but though the detail may help with the distribution as names are turned into numbers, constantly referring to lookup tables is tiresome. Various other marks are still used with DDC much as Cutter set out: title marks being the first letter of the title; biographies indicated by inserting a "z" between the Cutter number and work mark; commentaries done the same way but with a capital "Z;" edition marks shown with edition numbers or year of publication; copy and volume numbers shown with a "c" or "v" (Chan 1994).

11.3.3 Library of Congress

The LC classification removes the worry about how to specify book numbers. The rules are laid out in the system because it specifies almost complete call numbers. For book numbers, they use simplified Cutter numbers and a variety of indicators that show when books are collected works, commentaries, being ordered chronologically and so forth. Their numberings are chosen to fit their shelving needs. "The Library of Congress classification is a very close classification and if numbers from either the Cutter-Sanborn table or the Cutter three-figure table were used many call numbers would be unnecessarily long. Therefore, the Library of Congress developed its own author number table to be used with is classification schedules" (Lehnus 1980). The table has five short rules and can be found in any book that covers LC cataloguing.

```
(1)  After initial vowels
     for the second letter:     b  d  l-m  n  p  r  s-t  u-y
     use number:                2  3   4   5  6  7   8    9
(2)  After initial letter S
     for the second letter:     a  ch  e  h-i  m-p  t  u  w-z
     use number:                2   3  4   5    6   7  8   9
(3)  After initial letters Qu
     for the second letter:     a  e  i  o  r  t  y
     use number:                3  4  5  6  7  8  9
     For initial letters Qa-Qt, use:  2-29
(4)  After other initial consonants
     for the second letter:     a  e  i  o  r  u  y
     use number:                3  4  5  6  7  8  9
(5)  For expansion
     for the letter:            a-d  e-h  i-l  m-o  p-s  t-v w-z
     use number:                 3    4    5    6    7    8   9
```

D 644.M32 2002 is the LC call number for *Paris 1919: Six Months That Changed the World*, by Margaret MacMillan. D 644 indicates History (General)/ World War I/Peace/General works, M32 is MacMillan (a short Cutter number), and 2002 is the year of publication. This is a fairly simple call number. Some classes include "A" and "Z" Cutter numbers, where "a span of Cutter numbers at the beginning or end of the alphabetical sequence is assigned special meanings" (Chan 1994). Works about a person have this: A2 is appended for collected works by

NOTES

date, A4 for letters by date, A5 for speeches and lectures by date and others. This will collocate such collections in chronological order after books written by the person in question. That a book is a translation, or other such details, is shown by a second Cutter number.

Work marks can be added to the year of publication ("a" for the second edition that year, "b" for the third), but that is the limit of detail in LC call numbers. **QA 76.76.T49 G64 1997**, for *Writing GNU Emacs Extensions* by Bob Glickstein, is about as complicated as they get. It has a decimal in the class number and two Cutter numbers (albeit no work letter for the year of publication). Libraries can add collection numbers, and copy and volume numbers, as needed.

11.3.4 Chronological Ordering

All of the book number systems seen so far (except for Dewey's first attempt, using accession numbers) arrange books within a topic by author's last name. This is an obvious and sensible method of ordering. It will bring together all the books by one writer on the same topic, a helpful arrangement. However, the chronological ordering will be completely disrupted. Books on evolution by Charles Darwin will be followed by those by Richard Dawkins (metaphorically apt, since he is an important Darwinist). What of the 150 years between them? There is little room for names between Darwin and Dawkins, but they span the entire history of thought on evolution. A chronological ordering would put Darwin first (or near it), and moving across the shelf would show how the science progressed up to the latest work in the field.

Satija and Comaromi outline the arguments for and against chronological book numbers. In their favour, they are simple; there is no confusion when the same writer gets different Cutter numbers in different classes; when a book has multiple authors, one is not favoured over the others; the development of a subject can be they are an aid to weeding out of date books; there are no problems making Cutter numbers for non-European names. Against them, they note there is no well-developed system for using chronological numbers; that the arrangement is more helpful for organization than retrieval; that it separates different editions of the same book; and most importantly, that people remember names, not years.

Chronological book numbers are as old as author numbers. W.S. Biscoe, a disciple of Dewey, devised a system that the great man admired. James Duff Brown and Fremont A. Rider created their own systems (Satija and Comaromi 1992). All have rules for how to turn year numbers into shorter combinations of letters and numbers, which is their great fault. Biscoe's rules included (Satija and Comaromi 1992):

A (B.C.)

B up to 999 (B33 = A.D. 33, B 685 = 685)

C 1000-1499 (C236 = 1236, C423 = 1432)

D 1500-1599 (D20 = 1520, D 85 = 1585)

NOTES

...

V 1950-1959

W 1960-1060

X 1970-1979

Y 1980-1989 (Y5 = 1985, Y6 = 1986)

Z 1990-1999

"Biscoe was not concerned that his table would reach its limit with the letter Z in the year 1999, and commented that before this limit was reached someone would have devised a better scheme" (Lehnus 1980). Brown's Extended Date Table covered 1450-2125 using pairs of lower case letters (Satija and Comaromi 1992):

1450-1475 aa-az

1476-1501 ba-bz

...

1970-1995 ua-uz (up = 1985, uq = 1986, ur = 1987)

1996-2021 va-vz

2022-2047 wa-wz

All these systems have an enormous failing: they are needlessly and overwhelmingly complicated. The Indo-Arabic numerals are the best system for counting anything in western civilization and they are recognized all around the world by speakers of many other languages. To save one or two characters at the cost of making library users memorize an obscure conversion mechanism is no bargain. Proper names are made up of letters, and trimming them down to author numbers may not be as informative as using the full name, but they are still easy to read and ordered alphabetically. There are no such advantages to turning 1985 into **Y5** or **up**.

One particular advantage that chronological orderings have is that they do away with problems about making author numbers for non-European names. Cutter's tables try to spread numbers around so that the distribution over the range of names is proportional, but when Chinese, Indian, Arabic, and other names are in the collection, the tables do not work as well. Librarians in those cultures have made their own tables. Indeed, "[i]n view of the multiplicity of languages almost every Indian script and language has its own author number table for book numbers" (Satija and Agriwal 1990). There are different calendars used around the world, but far fewer than the number of languages, and the Gregorian calendar is widely known. Arranging chronologically leads to fewer problems when managing a varied and multicultural, multilingual collection.

NOTES

11.3.5 Colon Classification Book Numbers

S.R. Ranganathan's faceted Colon Classification (CC) is extremely detailed, precise, and informative, as is the book number system he made to go with it. In his *Colon Classification* (6th ed.) (Ranganathan 1964) he defined these terms:

03 The **Book Number** of a book is a symbol used to fix position relatively to the other books having the same **Ultimate Class**.

030 The **Book Number** of a book individualizes it among the books sharing the same class number.

031 The **Book Number** of a book is the translation of the names of certain of its specified features into the artificial language of ordinal numbers.

03012 The **Book Number** consists of an intelligible concatenation of one or more of the following symbols: the twenty-four Roman Capitals got by omitting I and O; the twenty-three Roman smalls got by omitting *i*, *l*, and *o*; the punctuation marks dot, hyphen, semicolon and colon; and the ten Indo-Arabic numerals.

0302 The **Book Number** may consist of one or more of the following successive **Facets**: Language Number; Form Number; Year Number; Accession Part of Book Number; Volume Number; Supplement Number; Copy Number; Criticism Number; and Accession Part of Criticism Number.

He also defined this formula for book numbers:

```
[L][F][Y][A].[V]-[S];[C]:Cr[Cr#]
[L]     = language number (can be left out)
[F]     = form number (can be left out)
[Y]     = year (the most important; comes from a table: e.g.
          N=1900-1999,
          P=2000-2099)
[A]     = accession part of year number (if more than one book
          from the same
          year)
[V]     = volume number
[S]     = supplement number
[C]     = copy number
Cr      = g indicates a volume of criticism
[Cr #] = accession part of criticism indicator
```

This is the most orderly book number system discussed. The language and form facets can be left out if they are the default (for example, English books), leaving the year of publication, which Ranganathan felt was the most important facet, first. He believed strongly in chronological ordering.

In many of the schemes of Book Numbers the name of the author is used to individualize a book. In Colon Classification, the Year of Publication and some other characteristics also in some cases, are used for the purpose. For except in Literature and in the case of the classics in any subject, where the author is made into a class in the Colon Classification, it is felt that the Year of Publication will be

NOTES

a more relevant and helpful characteristic than the name of the author for individualizing a book. If we remember that the library is a growing organism, it is more often the year of publication that determines the value of a book in all cases except the ones excluded above. The majority of readers are interested in the latest books in an ultimate class, while antiquarians may be interested in the oldest books. Most pedestrian works cease to have value to an ordinary reader at the expiry of ten to twenty years after publication. Any work with long-persisting value is likely to come out again in a new edition (Ranganathan 1964).

For example, a 1987 book written in Urdu about Indian history would have call number **V,44 168 M7** where V,44 is the class number and 168 M7 is the book number (168showing it is written in Urdu and M7 standing for 1987) (Satija and Agriwal 1990). A more complicated book number is 15w1K8.1g which indicates a book of criticism of volume 1 of a 1968 book of Sanskrit verse: 15 for Sanskrit (language), w1 for form (verse), K8 for year (1968), .1 for volume 1, and g for criticism.

As with all chronological systems, one writer's books on a topic will not be collocated. Further, different editions of the same book will be separated. A book published in 1968 with a second edition in 1975 would have copies filed at K8 and L5, with many books in between. Ranganathan said that if editions were to be kept together, it could be done by treating later editions as copies of the first. In this example, the first edition would be K8 and the second K8;L5. This brings together different editions of the same book, but at the same time destroys the chronological ordering that shows the progression of knowledge. Ranganathan knew that not everyone would like complete chronological ordering, but he felt its advantages outweighed its faults. He liked the ordering, and ways of turning numbers into shorter coded forms, so much so that in *Colon Classification* (1964) he includes two tables for doing this. One is especially for book numbers and turns four-number calendar years into three-character letter and number combinations.

11.4 CONSTRUCTION OF CLASS NUMBER

Class numbers look like lengthy algebraic equations, or even unwieldy and surrealistic except for few of them.

20th century bibliography on Merchant of Venice by Shakespeare

O,111,2J64,M+V"aN

Homeopathy for treatment of heart diseases of old people living in high altitudes

L-L-9Un4-9E,32;4:6

A history of the Association of Commonwealth Universities

T,18.1=CN48,g,9N"v

The US armament policy towards Pakistan from 1975 to 2017

V,73;1844X=M1'P17 ← N75

India's foreign policy towards Muslim countries

NOTES

V,44;181=(Q,7)

Sociological abstracts

Y"a"m73,N

Ranganathan sacrificed the brevity and simplicity of notation to make the notation extremely hospitable and to produce finely coextensive class numbers. His motto was "be minute, be minute, and be too minute". Most classifiers are afraid of the notation, and find the varying synthesis rules quite baffling. All that make the system unpopular, even dreaded.

11.5 COLLECTION NUMBER

In the art of library classification, the first division of books does not take into consideration the subject matter. For convenience of administration, every big library divides its documents into different sections. Every big library is a cluster of parallel libraries, i.e., libraries within a library. Parallel libraries are called sections. The first consideration is the section to which a book should go. We first determine whether the book under classification is a rare book, manuscript, thesis, textbook, reference book or any special collection book. These sections may be dictated by the utilitarian purpose such as reference or a textbook or for the convenience of managing them such as abnormal sized book, rare books, fragile or very precious books, and so on. Thus, in a library there are many mini libraries within a given library.

Notation for collection number

The symbol determining the section of the book preceding the class number is termed as the collection number. Putting the symbol for the **collection number** seems so simple and obvious that no scheme other than the CC has discussed it in an academic way. Here the collection number has been designed in relation to the book number; in many cases the collection number is denoted by adding some indicator digit to the book number. While in some cases—mostly utility oriented—a separate symbol is added for the collection number. It may be any arbitrary symbol, but usually the initials of the section name:

R	Reference
RR	Rare book
T	Thesis
Tx	Text
G	Government publication
RP	Reports

For departmental libraries, Ranganathan suggests the following convention:

BD	Mathematics Department
DD	Engineering Department
LD	Medical College
RD	Philosophy Department
YD	Sociology Department
ZD	Law Department

But for the abnormal books Ranganathan gives the following rules:

- Underline the book number for small sized books. Over line the book number for large sized books.
- Both underline and over line the book number for abnormal books.
- Encircle the book number for worn out and fragile books.

Since each symbol creates its own section, so no ordinal value of these digits has been fixed. These sections may be located at convenience. **The most general collection is not given any collection number**—application of the favoured category principle. Thus, majority of the books will have no Section Number.

The combination of collection number, class number, and the book number when taken together in the above sequence is termed as the call number. The equation is:

Call Number = Collection Number + Class Number + Book Number

It is the call number which determines the specific and unique place of a document in the library. It means every document has a unique call number in the library. It is called Call Number as in closed libraries in 19th century books were 'called' from the stacks by these numbers.

Using CC Book Numbers with other Schemes

It is not necessary that only the libraries using Colon Classification can use this book number system. Libraries using different schemes such as DDC, UDC, or Bliss' Bibliographic classification can use these book numbers with equal ease and effectiveness. But in such cases, some adaptation will have to be made. Sometimes, what Ranganathan has included in the Book Number is a part of class numbers in other systems. Form of a book a standard subdivision in the DDC; and in UDC language of the book is accounted for in the class numbers. Therefore, in such cases the CC book, numbers will have to be adapted accordingly.

Glossary

Call Number: A composite number which provides a unique identification number and, thus, a precisely identifiable place to a document on library shelves.

NOTES

Every document has its individual call number as is your telephone number in your region.

Chronological book number: Book numbers which sub arrange books in some serial order of their receipt in the library, or strictly speaking by the year of their publication. Chronological book numbers, which originated from the accession order, have been elaborated by W.S. Biscoe, J.D. Brown, and S. R. Ranganathan took it to almost perfection.

Collection number: Refers to the section of the library holding a certain type of documents, such as Manuscripts section, Textbooks section or Periodical publications section. The library's holdings are divided into section for convenience of management and safety of documents. This division makes a library a cluster of libraries within a library.

External notation: Another name for book/author numbers. A notation other than for the class number. It is termed so as it denotes some external characteristics of the document whereas the internal characteristics of the document are denoted by the class number.

Form of the Document: In the CC, it refers mostly to the internal format or the mode of presentation of the subject, for example, a book in pictures, or in data tables, or the subject presented in a dictionary or chronological order. It also refers to the external formats such as microfilm, or CD-ROM.

Language inequality: Refer to the situation when a commentary on a book of literature/languages is written in a language other than of the host book. For example, a book of Hindi literature written in English or *Gitanjali* by Tagore translated into French, and for that reason, in any language, other than Bengali; Shakespeare's *Hamlet* in Hindi or even in Spanish are instances of language inequality. Similarly, a book on Hindi grammar written in English is also a case of language inequality.

Check Your Progress

1. What is the main use of an accession number?
2. What is a call number?
3. Who is credited for the development of 'cutter numbers'?

11.6 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. An accession number is helpful in distinguishing multiple copies of the same book, as well as different volumes (or editions) of the same title.
2. A call number is a unique code that has been assigned by a cataloguer to an item and that is affixed to both the inside and outside of the item.

3. Charles Ammi Cutter, a prominent figure in the development of library science, first developed cutter numbers using a two-number table.

11.7 SUMMARY

NOTES

- Libraries use the Library of Congress Classification System (LC) to organize materials. Every item in our collection is assigned a unique call number, or address based on the subject and publication details.
- Books and scores in the UCB Music Library are organized on the shelves according to Library of Congress (LC) Classification.
- The basic outline of LC classification divides the entire field of knowledge into main classes that correspond largely to academic disciplines or areas of study.
- Each book or score in the Music Library is uniquely identified by a set of letters and numerals known as a call number (sometimes also called a shelf mark). Call numbers generally consist of two or three elements: an LC class number followed by a tag known as the Cutter number (or book number) and often a date.
- An accession number, also known as a catalogue number, is a unique number given to each new item that is acquired by a library.
- Book numbers are parts of call numbers, together with collection numbers and class numbers. Book numbers come at the end, and arrange books about the same subject so that they can be given useful order on the shelf and a unique location in the collection.
- A call number is a unique code that has been assigned by a cataloguer to an item and that is affixed to both the inside and outside of the item.
- The Cutter number is a coded representation of the author or organization's name or the title of the work (also known as the "Main Entry" in library-lingo). Charles Ammi Cutter, a prominent figure in the development of library science, first developed Cutter numbers using a two-number table.
- Book numbers (also called item numbers) combine with collection numbers and class numbers to form call numbers. Book numbers are a way of organizing and ordering books about the same subject that share the same class number.
- Book numbers do not usually reflect the subject of a book, but instead are based on external attributes such as author name or year of publication.
- S.R. Ranganathan's faceted Colon Classification (CC) is extremely detailed, precise, and informative, as is the book number system he made to go with it.
- In many of the schemes of Book Numbers the name of the author is used to individualize a book. In Colon Classification, the Year of Publication and some other characteristics also in some cases, are used for the purpose.
- Class numbers look like lengthy algebraic equations, or even unwieldy and surrealistic except for few of them.

NOTES

- In the art of library classification, the first division of books does not take into consideration the subject matter. For convenience of administration, every big library divides its documents into different sections.
- The symbol determining the section of the book preceding the class number is termed as the collection number. Putting the symbol for the collection number seems so simple and obvious that no scheme other than the CC has discussed it in an academic way.

11.8 KEY WORDS

- **Imprimatur:** It implies official permission to do something that is given by a person or group in a position of power.
- **Concatenation:** It refers to taking two or more separately located things and placing them side-by-side next to each other so that they can now be treated as one thing.
- **Antiquarian:** It relates to or dealing in antiques or rare books.

11.9 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions

1. Mention the elements of a call number.
2. Write a short note on the cutter number.
3. What is a book number?

Long Answer Questions

1. 'Book numbers give a unique shelf location to each book in a collection.' Explain the statement.
2. Discuss the construction of class number.
3. 'The symbol determining the section of the book preceding the class number is termed as the collection number.' Clarify the statement.

11.10 FURTHER READINGS

Parkhi, RS. 1960. *Library Classification: Evolution and Dynamic Theory*. Bombay: Asia Publishing House.

Raju A. 1991. *Universal Decimal Classification.* Madras: T.R. Publishers.

Ranganathan SR. 1963. *Colon Classification*. Sixth Edition. Bombay: Asia Publishing House.

Ranganathan, SR. 1965. *Prolegomena to Library Classification,* Second Edition. London: Library Association.

NOTES

UNIT 12 RANGANATHAN'S CONTRIBUTION TO CLASSIFICATION THEORY

Structure

12.0 INTRODUCTION

This unit will introduce you to the life and major works of S. R. Ranganathan especially his contribution to classification theory. He is credited to be the father of development of library science. His Colon Classification (1933) introduced a system that is widely used in research libraries around the world. He was honoured with the Padma Shree, the country's fourth highest civilian honour, in 1957 for his indispensable contribution in the field of library science.

12.1 OBJECTIVES

After going through this unit, you will be able to:

- Prepare a brief biographical note on the life of S R Ranganathan
- List the major works of Ranganathan
- Discuss the major tenets of the Classification theory

12.2 LIFE AND WORKS OF RANGANATHAN

Ranganathan, Indian librarian, philosopher, and mathematician, was born on 9 August1892, in Shiyali, Tanjavoor district, Madras, when India was still under the British Rule. He earned his BA and MA degrees in mathematics from Madras Christian College. Although he did not have any formal training in librarianship, he was appointed to the position of librarian of the Madras University in 1924. The

NOTES

following year he travelled to London to study at the School of Librarianship of University College under the supervision of WC Berwick Sayers. After his return to India, he worked in the field of library science as a professor for 40 years. He wrote more than 50 books on library science and articles and books about mathematics, mainly related to the history of mathematics. He died at the age of 80, on 27 September 1972, in Bangalore, India.

Ranganathan's family belonged to the Brahmin caste, traditional Hindu hereditary system of social stratification in India. The Brahmin caste is considered the highest in the Indian society since its members are believed to have come from Brahma's head, and Brahma is often credited as the creator of the universe. He lost his father very early, at the age of six, and was raised by his grandfather, who was a Brahmin and a school teacher and who taught him the values of Hinduism. Ranganathan married Sarana in 1928 and had only one child. He was very religious and highly, political, and he admired Gandhi.

Ranganathan's education was strongly influenced by the Eastern culture and the holistic vision of the universe. The Brahmin and Chinese cultures, as well as astrology had leading presence in his life. In Brahmin culture, meditation is taught to young people at an early age, and it is considered an activity to purify the mind, leading to concentration and knowledge. Other important values of the Brahmin culture are discipline, religiosity, rigour and labour. The English language also influenced Ranganathan since at that time India was under the British Rule.

Ranganathan is viewed among the most influential theorists such as Dewey, Panini, Aristotle, Newton, Hegel, and Darwin among others.

He was dissatisfied with the existing bibliographic classification systems when he worked as a librarian because they were marked by hierarchical rigidity. Thus, he suggested the creation of a more flexible system known as Colon Classification, which was first published in 1933. This classification system treats knowledge as a multidimensional structure: the interconnections of each concept are spread in many directions, and each subject is usually a synthesis of several multiple connected concepts, thus, adopting an analytico-synthetic approach. The division of knowledge is understood to be based on the study of its facets and sub facets, which means the representation of the same subject from various points of view.

Ranganathan authored more than 50 books and published a large number of articles in periodicals and in conference proceedings. His works cover subjects that include various fields of Library Science, such as classification, cataloguing, reference service, library organization, book selection, library administration, and documentation, a field of study similar to librarianship.

The Five Laws of Library Science is a theory that deserves special attention in the field of Librarianship: They are the following:

(i) The books are for use;

(ii) Every reader his/her book;

(iii) Every book its reader;

(iv) Save the time of the reader;

(v) The library is a growing organism.

These laws appear to be simple or even naive, but they have a deep meaning and content since they propose a comprehensive philosophy for Librarianship and are considered as fundamental statements for the goals that information services should seek to achieve.

NOTES

The first edition of Ranganathan's five laws was published in 1931 and was an attempt to develop scientific guidelines for libraries whose practices were essentially empirical. These laws establish the principles that information units must follow. Garfield, the founder of the Institute of Scientific Information of Philadelphia (ISI) emphasized the importance of the five laws for India in the 1930s.

Today these laws seem self-evident, but they certainly were not when they were enunciated. Particularly in India, he explains, a colony during Ranganathan's days, libraries were hardly among the most progressive, and there was no public library system as such; libraries were usually associated only with universities and other academic institutions. With the laws, in fact, Ranganathan provided India and other developing countries with openness to the democratic library tradition, which was then a privilege of the United States and England after the late 19th century.

French researcher Alireza Noruzi, from the Department of Information Science of Paul Cézanne University, has also updated Ranganathan's five laws in order to apply the principles to the Web. According to Noruzi (2005), the Web is the global hypertext system providing access to documents written in a script called Hypertext Markup Language (HTML) that allows its contents to be interlinked, locally and remotely. The five Web laws, updated by Noruzi are: (1) Web resources are for use; (2) every user has his or her Web resource; (3) every Web resource its user; (4) save the time of the user; (5) the Web is a growing organism. Accordingly, a review of the concepts of library, reader, and book for the Web, user, and information, and/or resource can be identified. Thus, Noruzi (2005) updated the principles, but the philosophy behind these concepts continued to be the same: democratization and easier access to information.

The faceted classification theory developed by Ranganathan is an important contribution to the classification theory, and it has been presented in his several works, such as *Prolegomena* to Library Classification; Philosophy of Library Classification, and Colon Classification.

12.3 CLASSIFICATION THEORY

Classification theory has applications in all branches of knowledge, especially the biological and social sciences. Its application to mathematics is called the Set theory. It is a method and a process for establishing classes in a classification system of elements that share at least one common characteristic and can be organized according to a point of view or specific characteristics. For example, individuals can be grouped according to age, gender, profession and other aspects.

NOTES

A classification cannot be permanent, accurate and comprehensive because every different time and situation requires a specific classification. Every period of time has different characteristics, focus, thoughts and theories which require their own classification structures. Therefore, the problem in the classification of a field of knowledge, from the Greek Dark Ages to contemporary times, is the definition of the principles and postulates into which classes can be grouped to organize and represent the knowledge contained in the documents. Corroborating these ideas, Jacob and Albrechtsen (1998, p.523) argue that:

> A classification scheme epitomizes Foucault's notion of a well-constructed language in that it constitutes a whole domain of empiricity as at the same time describable and orderable ordering and describing it'. In a heterogeneous environment, a controlled vocabulary facilitates the exchange of knowledge, neutralizing distortions. [...] any given point in time is characterized by a general model of knowledge, which determines what and how it can be expressed, according to what criteria and premises and what order. Reality exists independently of our effort to know it, and language is the means by which we can describe this reality in a more or less objective manner.

The origin of the art of knowledge classification probably dates back to 1491, with Angelo Poliziano, an Italian humanist and poet, with the publication of "Panepistemon", which showed, in schematic form, the relationship between the sciences. Before then, classification was just an art, like encyclopaedias, for example, which were systematically organized based on some idea as an end in themselves.

In the field of Library and Information Science, the classification theory principles are applied to the organization of knowledge, initially developed for the creation of specific classification systems. These principles are related to the organization of groups of subjects according to their similarities and differences based on a set of characteristics. This is the field of information representation, which refers to the ordering of the classes of subjects in the classification schemes. According to Araújo:

> [...] the essential elemenwt that characterizes the classification process is the systematic and methodical formation of groups, the organizing action of ordering a certain set of beings or things into smaller groups according to similar characteristics shared by some of them (which include them in a certain group) and not shared by the others (which do not belong to this group). In this process, a division criterion is established based on processes of differences and similarities, agreements, and validations.

Accordingly, classifying is essentially a mental process of applying divisional characteristics to a certain set of objects (phenomena, situations, information and things) due to the addition of a characteristic and/or difference. In the practice of classification, the principles used in this division and grouping take into account the nature of what is being classified. Thus, identifying the similarities and differences between objects is an important task in the classification process. For example, plants and animals can be classified according to their genetic characteristics, and

NOTES

water can be classified according to its hardness (water can be soft, moderate soft, hard, or excessively hard, depending on its amount of mineral salts). Therefore, it can be said that the selection of the characteristics that will be used to classify the objects reflects the purpose of the classification being constructed. Piedade stated that there are as many classifications as there are characteristics that can be used as the basis of division. There are as many possibilities to classify as there are similarities and differences between objects or ideas to be classified. Thus, classification systems play a key role in the representation, organization, location, retrieval, and access to knowledge and information resources in information retrieval systems.

12.4 CLASSIFICATION SYSTEMS

Classifications evolved from purely philosophical schemes, with no intention of ordering anything into the modern systems of bibliographic classification used in the organization of libraries and even in digital contexts. Therefore, an overview of the development of classification systems is presented, starting with the philosophical schemes that gave rise to the current classification systems.

A brief history of classifications

Barbosa defined philosophical classifications as purely theoretical classifications constituting groupings of human knowledge according to the point of view of its idealizers. A similar definition was provided by Piedade, philosophical classifications are those created by philosophers with the purpose of defining, schematizing and hierarchizing knowledge.

Among the philosophers who studied Classification Theory are Aristotle, Greek philosopher and student of Plato and Porphyry. Plato divided human knowledge into three sciences: physics, ethics and logic. Since ancient times, Aristotle's studies encompassed science and he divided knowledge into three parts: theoretical, practical and productive. He believed that every field of knowledge has its own general laws, which control its thinking and procedures that are distributed from the simplest (specific) to the more complex (general) ones.

Porphyry, who was also a Greek scholar, stood out by proposing a binary or dichotomous classification system with division of classes from general to specific subjects. In the division proposed by him, also known as the "Tree of Porphyry", knowledge is subdivided successively due to the inclusion of a difference and/or a characteristic. At the end, there is a term that cannot be further divided. This classification system is based on the logical division of genus and species. In the book *Advancement of Learning*, Francis Bacon [1561-1626], English politician, philosopher and essayist classified the knowledge or sciences into Memory, Imagination and Reason based on human faculties. Such division culminated in another one: History, Poetry and Philosophy.

French philosopher and mathematician, Auguste Comte [1798-1857], proposed the division of human knowledge according to the order of increasing complexity and decreasing generality. He divided sciences into abstract

NOTES

(fundamental) and concrete (derived). The division proposed by Comte gave rise to seven disciplines, namely: Mathematics, Astronomy, Physics, Chemistry, Biology, Sociology and Morality.

It is important to emphasize that the continuous effort of the philosophers towards the attempt to systematize knowledge was the basis for the development of bibliographical classifications, which are discussed in the next section.

12.4.1 Bibliographic Classifications

It is worth mentioning that the development of new classification systems reflects an effort to improve previously proposed schemes. A fact that can confirm such assertion is that bibliographical classifications that originated in the classification of human knowledge, initially proposed by Plato.

In the context of Library and Information Science, according to Barbosa, bibliographic classification is understood as the process of arranging books according to their subject, and a pre-established system, allowing them to be stored in a certain order in the collection, *i.e*., they have a relative location. Thus, bibliographic classification is, in the broad sense of the term, a process of indexation since it aims to gather informational items (from collections, catalogues and bibliographies) whose contents have similar subjects arranged based on logical principles of organization.

Bibliographic classification systems are symbolic languages of indexation that were developed based on the philosophical classifications due to the need for systematization and organization of bibliographical collections, catalogues, and reference list or bibliography in order to group items by subject to meet the interests of the readers or library users.

The system discussed by Barbosa is composed of classes and/or group of subjects with some degree of similarity. An important characteristic in the arrangement of these classes in the classification system is the principle of useful sequence, according to which subjects are subdivided from the more general to the more specific. On the other hand, according to Piedade , a classification system or classification table is a set of classes presented in a systematic order.

The first evidence of a book classification scheme was found in the Library of Alexandria, and it was inspired by the Aristotle's classification. Callimachus, a Greek librarian, poet, grammarian, and mythographer organized a catalogue called Pinakes, in which he listed works alphabetically by author and genre, resulting in the following division: poets (epic, comic, tragic, and dithyrambic); legislators; philosophers; historians; orators, and miscellaneous writers. The system he adopted uses chronological order and alphabetical order in the section concerning the authors.

In the Middle Ages, between the 5th and 15th centuries, the use of large classes of subjects in the arrangement of books was common, and within these classes the books were arranged by size. In the 17th century, the French librarian Gabriel Naudé (1600-1653) created, in 1643, a new classification system that encompassed twelve classes: Theology, Medicine, Bibliography, Chronology,

Geography, History, Military Art, Jurisprudence, Canon Law, Philosophy, Politics and Literature.

Moreover, in the 17th century France, the System of the Paris Booksellers or the French System and the Table méthodique, developed by Jacques Charles Brunet, stood out in terms of the organization and arrangement of bibliographies. Brunet created his table based on adaptations of the French System, which served as the basis for the classification used in the National Library of France in Paris.

NOTES

In 1876, the first version of one of the largest bibliographic classification systems, the Dewey Decimal Classification (DDC), was first published in the United States by the librarian Melvil Dewey (1851-1931). The Dewey Decimal system was the first to use decimal numbers for classification symbols using pure notation (Arabic numerals only). Knowledge is divided into ten main classes (000 to 900), successively subdivided into ten other classes, based on the principles of division established by Francis Bacon (knowledge or sciences divided into three major groups: Memory, Imagination and Reason). The system also has special tables, such as racial groups, language, geographical distribution and chronological organization, which allow greater specificity in the representation of the subjects. A relative index represents the several occurrences of the same subject in the scheme, and a three-digit number represents the main class. DDC is the most widely used system in libraries, especially in public libraries. It has inspired the development of other systems, such as the Universal Decimal Classification (UDC), used mainly in specialized libraries.

Another classification initiative, the Expansive Classification System, was developed by the American librarian Charles Cutter in 1891, in which the subjects are represented by letters. The Expansive Classification System was published 15 years after the Dewey system and consists of seven classifications to be adopted in libraries according to the size of their collection. Cutter's classification system influenced the Library of Congress Classification (developed by the Library of Congress), which emerged at the end of the 19th century, and its first edition was published in 1901. Other important contributions of Cutter to Library and Information Science are the Rules for a Dictionary Catalogue and the table for standardizing author names and geographic place notations, known as Cutter Table; still used in libraries today..

The Universal Decimal Classification (UDC) was created by Paul Otlet and Henri de La Fontaine. They were responsible for the organization of the Universal Bibliographic Repertory project, whose purpose was to capture the totality of the human knowledge by gathering information on every book published in the world. The DDC was the instrument used in the organization of this repertory, and it was initially translated. Innovations were made in this system, through the inclusion of mechanisms that allowed the combination of compound subjects; it was the first semi-faceted bibliographic classification system to be developed. The first edition of the UDC was published in 1905 in French by the International Institute of Bibliography, *Manuel du Répertoire Bibliographique Universel*. The International

NOTES

Federation for Information and Documentation (FID) managed the UDC, from its creation around the year 1900 until the end of 1991. The UDC Consortium (UDCC), a body that brings together Standard Institutional Information from different countries, assumed ownership of UDC on 1 January 1992. In Brazil, the first partial edition of UDC in Portuguese was published in 1976 by the *Instituto Brasileiro de Informação em Ciência e Tecnologia* (IBICT, Brazilian Institute of Information in Science and Technology). The system is organized into main and auxiliary tables and uses a mixed notation (numbers, letters, and signals). The first type of tables are tables of subjects with their respective numbers, and the second are tables that show the signs and subdivisions that allow the construction of compound subjects.

In 1906, James Duff Brown (1816-1914), a British librarian, released his classification system, the Subject Classification. The last edition of this classification was published in 1939. Henry Evelyn Bliss, a librarian of the College of the City of New York, created a classification system called Bibliographic Classification, also known as Bliss Classification. Its first full volume was published in 1940; the second volume was published in 1947; and the third and fourth volumes in 1953. Bliss adopted the division of human knowledge into five major groups: Philosophy, Science, History, and Technology and Art. Each group is then subdivided into classes, grouped side by side in subordinate classes, according to their degree of similarity, which allows the coordination and subordination of the subjects. This is one of the main characteristics of this system.

The last great general bibliographic classification system to emerge was Ranganathan's Colon Classification. The system was first published in 1933, and the last edition dates to 1960. It was the first fully facetted system, which due to its importance in the field of classification theory, is presented and discussed below.

The Colon Classification is the first ever faceted classification scheme. It was developed by Ranganathan and published for the first time in 1933. Its tables were improved in the other CC editions published in 1939 (2ndedition), 1950 (3rd edition), and 1960 (6th edition). The last edition (6th edition) was reprinted in 1963. It has around 200 tables, and it is also called the analytico—synthetic classification since it involves analysis and synthesis, that is, the symbols are constructed and synthesized during document analysis.

The name "Colon Classification" comes from the use of colons (:) to separate facets into class numbers. The Colon Classification notation uses mixed notation: Arabic numerals, lower case and upper case letters, Greek letters, and graphic signs (period, comma, colon, semicolon, parentheses, hyphen, and apostrophe). In this classification system, Ranganathan divided knowledge into 42 broad subject classes.

In the Colon Classification, the construction of class numbers follows the Personality, Matter, Energy, Space, Time (PMEST) order and the facet formula, which comes at the beginning of the class and determines how the numbers should be formed. Ranganathan also used Auxiliary Tables similar to those in the UDC. Colon Classification includes Tables for the representation of: geographic

NOTES

subdivisions - representation of the facet Space, such as empires, groups of countries, zones, and cardinal points; chronological subdivisions - representation of the facet Time, such as years, days, seasons, weather conditions; subdivisions of language - classes of Literature and Linguistics; and common subdivisions - to specify the document type, such as a periodical or journal, letter, treaty, statistical report, general reports, among others. Colon Classification also uses chain indexing, which specifies all contexts in which a term occurs.

Based on the literature review, it is important to discuss some features of this classification. Firstly, the classifier using the Ranganathan scheme must have a comprehensive knowledge about his/her field, which should be broader than the knowledge required for classifiers using enumerative systems, such as DDC and UDC. An example is the classification of an area such as medicine: in order to correctly use the system, the classifier must know the causes of diseases and the organs affected by them; otherwise, the classification would be incomplete.

Another important aspect is related to the fact that the unlike enumerative systems (DDC and UDC), numbers are not ready in the scheme; they are constructed during document classification. The Ranganathan system can be considered laborious due to the use of formulas to construct the classification symbols. Considering the high number of publications to be indexed in libraries and the time that would be required for the analysis of the document and the construction of the classification numbers, the adoption of Colon Classification on a daily basis in libraries is almost unfeasible. This may be one of the justifications for the low rate of adoption of Ranganathan's classification in Western libraries. However, there are indications of some libraries in India that have adopted this system in the literature.

It is worth highlighting the influence of Ranganathan's mathematical thinking on the development of the Colon Classification system, which can be seen by the use of facet formulas that provide instructions on how to construct classification symbols.

One issue to be discussed is the potential difficulty in locating documents, encountered by the end user of this classification scheme. Library users often find it difficult to locate books on the shelves when traditional classification systems are adopted. Therefore, one can imagine how difficult it can be locating books classified using complicated symbols that are unfamiliar to the user, such as those in the Colon Classification.

Among the favourable aspects of the representation of knowledge identified in the Colon Classification are: the representation of the subject of the document can be very specific; the possibility to represent various aspects of the same subject, which is not possible in the enumerative systems; and the possibility of applying this scheme to broader contexts, especially digital contexts. The principles used in the development of the Colon Classification led to the development of the Faceted Classification Theory, which stimulated studies on classification theory.

NOTES

Check Your Progress

1. When was S R Ranganathan appointed the librarian of the Madras University?
2. In which year was the first edition of Ranganathan's five laws published?
3. Name the philosophers who studied classification theory.
4. Who created the Universal Decimal Classification (UDC)?

12.5 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. S R Ranganathan appointed the librarian of the Madras University in the year 1924.
2. The first edition of Ranganathan's five laws was published in 1931.
3. Among the philosophers who studied classification theory are Aristotle, Greek philosopher and student of Plato and Porphyry
4. The Universal Decimal Classification (UDC) was created by Paul Otlet and Henri de La Fontaine.

12.6 SUMMARY

- Ranganathan, Indian librarian, philosopher, and mathematician, was born on 9 August1892, in Shiyali, Tanjavoor district, Madras, when India was still under the British Rule.
- Ranganathan's education was strongly influenced by the Eastern culture and the holistic vision of the universe. The Brahmin and Chinese cultures, as well as astrology had leading presence in his life.
- Ranganathan authored more than 50 books and published a large number of articles in periodicals and in conference proceedings.
- French researcher Alireza Noruzi, from the Department of Information Science of Paul Cézanne University, has also updated Ranganathan's five laws in order to apply the principles to the Web.
- Classification theory has applications in all branches of knowledge, especially the biological and social sciences. Its application to mathematics is called Set Theory.
- The origin of the art of knowledge classification probably dates back to 1491, with Angelo Poliziano, an Italian humanist and poet, with the publication of "Panepistemon", which showed, in schematic form, the relationship between the sciences.
- Classifications evolved from purely philosophical schemes, with no intention of ordering anything into the modern systems of bibliographic classification used in the organization of libraries and even in digital contexts.

- French philosopher and mathematician, Auguste Comte [1798-1857], proposed the division of human knowledge according to the order of increasing complexity and decreasing generality.
- The Universal Decimal Classification (UDC) was created by Paul Otlet and Henri de La Fontaine.
- In 1906, James Duff Brown (1816-1914), a British librarian, released his classification system, the Subject Classification.
- The last great general bibliographic classification system to emerge was Ranganathan's Colon Classification.
- In the Colon Classification, the construction of class numbers follows the Personality, Matter, Energy, Space, Time (PMEST) order and the facet formula, which comes at the beginning of the class and determines how the numbers should be formed.

12.7 KEY WORDS

- **Empirical:** It refers to experiments or experience rather than ideas or theories.
- **Set Theory:** It is a branch of mathematical logic that studies sets.

12.8 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions

1. Write a short note on the life of S R Ranganathan.
2. List the major works of S R Ranganathan.
3. Write a short note on bibliographic classifications.

Long Answer Questions

1. Discuss the basic features of the classification theory.
2. Explain the origin of the classification theory.

12.9 FURTHER READINGS

Parkhi, RS. 1960. *Library Classification: Evolution and Dynamic Theory*. Bombay: Asia Publishing House.

Raju A. 1991. *Universal Decimal Classification.* Madras: T.R. Publishers.

Ranganathan SR. 1963. *Colon Classification*. Sixth Edition. Bombay: Asia Publishing House.

Ranganathan, SR. 1965. *Prolegomena to Library Classification,* Second Edition. London: Library Association.

UNIT 13 TRENDS IN LIBRARY CLASSIFICATION

NOTES

Structure

13.0 INTRODUCTION

In simple words, Knowledge Organization (KO) is about activities such as document description, indexing and classification performed in libraries, bibliographical databases, archives and other kinds of "memory intuitions" by librarians, archivists, information specialists, subject specialists, as well as by computer algorithms and laymen. KO as a field of study is concerned with the nature and quality of such Knowledge Organizing Processes (KOP) as well as the Knowledge Organizing Systems (KOS) used to organize documents, document representations, works and concepts. Library and Information Science (LIS) is the central discipline of KO in this narrow sense (although seriously challenged by other fields, computer science).

In this unit, you will study about the meaning and concept of Knowledge Organizing Systems (KOS), ontology, folksonomy and taxonomy.

13.1 OBJECTIVES

After going through this unit, you will be able to:

- Explain the meaning of Knowledge Organizing Systems (KOS)
- Define ontology, folksonomy and taxonomy

13.2 KNOWLEDGE ORGANIZATION (KO) IN THE INTERNET WORLD

NOTES

In broader sense, KO about the social division of mental labour, i.e., the organization of universities and other institutions for research and higher education, the structure of disciplines and professions, the social organization of media, the production and dissemination of "knowledge" and so forth. A book such as Oleson & Voss (1979) *The Organization of Knowledge in Modern America, 1860-1920* is an example of the study of knowledge organization in the broad sense. We may distinguish between the social organization of knowledge on one hand, and on the other hand the intellectual or cognitive organization of knowledge. The broad sense is, thus, both about how knowledge is socially organized and how reality is organized. The uncovering of structures of reality is done by the single sciences, for example, chemistry, biology, geography and linguistics. Well known examples are the periodic system in chemistry and biological taxonomy. Generalized theories about the structure of reality, such as *the theory of integrative levels* first advanced by Auguste Comte belong to the philosophical disciplines "metaphysics" and "ontology".

While Library and Information Science (LIS) is the central discipline concerned with KO in the narrow sense of the word, other disciplines such as the sociology of knowledge, the single sciences and metaphysics are central disciplines concerned with KO in the broader sense of the word. The importance of the broader field of KO is related to the question about how KO in the narrow sense can be developed. A central claim of this unit, is that KO in the narrow sense cannot develop a fruitful body of knowledge without considering KO in the broader perspective. In other words, there exists no closed "universe of knowledge" that can be studied by KO in isolation from all the other sciences' study of reality.

Further description of the field of KO is dependent on the theoretical perspective, which is why we shall introduce the most important perspectives below.

13.2.1 Theoretical Approaches to Knowledge Organization

KO has mainly been a practical activity without much theory. Miksa, for example, wrote:

> Now, we could simply conclude with Dolby and others that library classification continues mainly as a practical matter, that it is by and large devoid of substantive intellectual content, and that it continues merely because of inertia in a field in which classification schemes invented late in the nineteenth century continue to be used (Dolby 1979, p. 187; Mayr 1982, pp. 1-48)" (Miksa 1998, 49).

It has often been assumed that the practical organization of knowledge can be done by applying common sense or, in major research libraries and bibliographical databases, by employing subject specialists, who just apply their special knowledge. LIS professionals have often concentrated on applying new technology, software

NOTES

and standards. They have often seen themselves as applying standards for description of a relative objective nature. In other words, practical KO have been seen as a syntactic, rather than as a semantic activity as differentiated by Julian Warner:

> "Semantic labor is concerned with transformations motivated by the meaning or signified of symbols, while syntactic labor is determined by the form alone of symbols, operating on them in their aspect as signals. Semantic labor requires direct human involvement while originally human syntactic labor can be transferred to information technology, where it becomes a machine process. " (Warner, 2007).

Since the 1950s, computer scientists have been working with KO based on certain assumptions, mostly assuming that human classification and indexing will soon be made superfluous. A recent example (Sparck Jones 2005) is that automated systems based on relevant feedback from users might solve problems efficiently. Genuine theoretical contributions to KO are very rare, but seem mandatory in relation to the challenges with which this field is confronted. More and more people discuss the doomsday scenario for Library and Information Science. There exist many separated communities working with different technologies, but very little research about their basic assumptions and relative merits and demerits exists. The problem is not just to formulate a theory, but to uncover theoretical assumptions in different practices, to formulate these assumptions as clearly as possible in order to make it possible to compare approaches.

A further problem is that the adherents of different approaches try to avoid criticism by incorporating ideas from competing approaches. The field cannot advance, however, without theoretical clarity, which is why it is important to describe different approaches in a way that they can be distinguished from each other and compared with each other. In other words, we have to examine and interpret different labels used for approaches very honestly and carefully. Otherwise we will stay in a very muddled field.

One way to classify approaches to KO was suggested by Broughton; Hansson; Hjørland & López-Huertas (2005):

(i) The traditional approach to KO expressed by classification systems used in libraries and databases, including DDC, LCC and UDC (going back to about 1876).

(ii) The facet-analytical approach founded by Ranganathan about 1933 and further developed by the British Classification Research Group.

(iii) The information retrieval tradition (IR) founded in the 1950s.

(iv) User oriented / cognitive views gaining influence from the 1970s.

(v) Bibliometric approaches following Garfield's construction of the *Science Citation Index* in 1963.

(vi) The domain analytic approach (first formulated about 1994).

(vii) Other approaches (Among recent suggestions are semiotic approaches, "critical-hermeneutical" approaches discourse-analytic approaches and

genre-based approaches. An important trend is also an emphasis on document representations, document typology and description, mark up languages, document architectures etc.)

NOTES

13.3 A SYNTHESIZED SIMPLE TAXONOMY OF FUNCTIONS OF KNOWLEDGE ORGANIZATION SYSTEMS

Let us now examine a synthesized simple taxonomy of functions of knowledge organization systems.

1. Class Retrieval

In a broad sense, all knowledge organization systems are arguably intended for retrieval, ultimately for pointing to the user toward documents of interest more efficiently than if he were to browse through a random ordering of documents. (Mills 1969). This statement has sometimes stopped the inquiry into functions of knowledge organization systems in its tracks before it has begun. However, as we will see, there are many distinct avenues toward this ultimate goal (and possibly other goals) that are worthwhile to identify. What we identify here as the function of *Class Retrieval* indicates a specific method of retrieval, involving collocating items belonging to specific and intentionally chosen classes, or an intentionally chosen post-coordinated algebraic combination of specific classes. The user identifies classes or terms from the controlled vocabulary that will contain documents meeting certain criteria or having certain characteristics of interest, and then retrieves the selection of documents belonging to those classes. A Classification Research Group Memorandum (1955) proposes a model for information acquisition which assumes this type of retrieval function exclusively:

(i) identifying the exact subject of a search;

(ii) locating the subject in a guide which refers the searcher to one or more

(iii) Documents;

(iv) locating the documents;

(v) locating the required information in the documents.

This idealized view of retrieval is just one function of knowledge organization. Note that we include under this heading this type of class retrieval, without distinction of *which* characteristics of interest the user may be interested in retrieving on, or the system may support. So we include both Vickery's (1955) "provide for selection of a set of records likely to be relevant to a particular topic," and "provide for the selection of a group of records lying within a certain subject field." The key to this function is the selection of records formally collocated by the knowledge organization system.

NOTES

It is worth noting that a given knowledge organization system may provide for the user choosing a class according to multiple characteristics, at multiple levels of generality. The introductory material to the BC2 classification (Mills and Broughton 1977,) use the example of a document on 'industrial relations in the motor vehicle industry of Great Britain during the war,' specifying that it "should be retrievable in response to any combination of its constituent element classes" (e.g. "Industrial relations", "motor vehicle industry", etc.), and also at different hierarchical levels ("Manufacturing industry" as more general than "Motor vehicle industry", or "Motor accessories industry" more specific). Different systems may make different characteristics of selection available, as well as more or fewer characteristics of selection. Chan (1990) mentions that one of the benefits of the Library of Congress Classification used for retrieval is that its organization makes it easier to search at a more general level, and also makes it easier to organize a retrieval set based on disciplinary perspective. Markey (1986) also notes that DDC groups items together according to different characteristics of interest than LCSH.

Browsing

The Association for Library Collections and Technical Services (ALCTS) report dated 1999, specifies a "browsing" function as "examining adjacent resources within similar class, or across adjacent classes. One of the uses of "traditional classification" in an online environment that Svenonius (1983) identifies is "to provide a structure for meaningful browsing." Exactly what "browsing" comprises is often not defined in these discussions of classificatory functions, but it is some sort of exploratory or investigatory, probably iterative, interaction with a corpus, to be contrasted with the more specifically directed aims of Class Retrieval. It is to some extent what has been thought of as the domain of traditional 'classification' as opposed to alphabetic subject languages. Note that browsing can happen among physical documents arranged on a shelf, or online, or in a printed catalogue of some kind—with different possibilities and requirements made of the system. The ALCTS (1999) report writes that in order for browsing to be supported "displays of resources need to be listed in class number order", but of course online this is just one way to support browsing, and other multi-dimensional methods are also possible. An example of another kind of browsing possible in an interactive online environment is given by Marchionini (2003). The expanded possibilities of various forms of browsing in an online retrieval system, rather than among a physical arrangement, are a driving force in the reevaluation of the function of knowledge organization systems.

Relationship Navigation

ALCTS (1999) and Chan (1990) both specifically address a kind of hierarchical navigation. The ALCTS report specifies "hierarchical movement", and Chan talks of how "and one can move up or down a set of records that are displayed in call number order, to broaden or narrow a search." Of course, using call number order is just one way of accomplishing this function, and hierarchical relationships of

NOTES

broadening and narrowing are also just one kind of relationship that can be followed. Mills (1969) notes that "a given class cannot fail to be related to many other classes in addition to those in which it is juxtaposed" in a single linear order as in traditional classification, and that the shelf order therefore "must be supplemented by indexes (catalogues)" to "utilize every facility possible for indicating the multiple connections between classes." While relationship navigation may be traditionally considered a form of browsing, also recall Cutter's (1876) argument that relationship navigation serves as recourse when one's initial class selection does not provide satisfaction.

Identification

The Identification function is served by listing assigned class or term information on a record so that the user knows more about the nature of the document indicated. Traditionally, subject tracings on library cards served this function, perhaps unintentionally. ALCTS (1999) describes one way to serve this function as "when a searcher sees a class notation in a listing and uses this information to identify the subject content of the website being classified." Of course, an actual natural language description or heading (as in subject tracings) may likely serve the user better than an obscure notation.

Locating

This is the traditional function of traditional classification as a 'shelf location device' (Chan 1990, p. 9): A means to identify exactly where to find a given known document. The ALCTS (1999) report identifies this function, but considers it an "outmoded" function of classification when Web pages are the items classified, because URLs are instead used as locating devices. Chan (1990) suggests that one could look up a known item in a catalogue by class number, although it is not entirely clear why one would want to. This function could be correlated to the third step in the CRG (1957) model of information acquisition identified above: "Locating the documents."

Ordering

Knowledge organization systems can be used to provide one or more useful arranged sequences or orders to a set of documents. Vickery (1971) describes one aspect of this function as "to provide for the ordering of a group of records into a meaningful sequence." This may mean the ordering of a retrieval set online, or of a catalogue, and we also include here the traditional physical shelf ordering function of classification, as identified by Mills (1969), who also notes that while shelf ordering requires a single arrangement, multiple helpful arrangements are always possible and can be provided by the system. What Vickery identifies as a separate function, we also include under this heading: "to provide for the sequencing of a set of selected records according to probable relevance to a particular topic." The ALCTS (1999) report does not draw this out as a separate function, but instead uses classificatory ordering as the operationalization of support for browsing. We note that an ordering is just one way to support browsing, and that ordering may additionally be used for other purposes.

NOTES

Surveying

Knowledge organization systems can be used to allow the user to get a general overview of what exists in a corpus. The ACLTS (1999) report calls this function "profiling", described as "giving a portrait of a collection of… resources." Marchionini and Brunk (2003) identify this as a benefit of their Relationship Browser interface, "enabling understanding the scope and extent of the corpus through active exploration of different 'slices' defined by different attribute-value juxtapositions." While Marchionini and Brunk use a classificatory structure that resembles (but may not be) a facetted classification to drive their interface, it is clear that even traditional non-facetted classification has functioned to help users gain a sense of scope and extent of a corpus.

Something like this function is identified by Cutter (1876) as being one of the advantages of the classified arrangement: "So that he can take a general survey of the ground before he chooses his route". This indicates a somewhat ambiguous relationship here between the *Surveying* function and the *Browsing* function often thought of as the central role of the classified (as opposed to alphabetic) system of knowledge organization. And recall also that Vickery's version of the "general survey", we assigned to the *Class Retrieval* function.

Dealing with Large Result Set

Classification can be used to help users deal with large result sets returned by interactive online systems. Markey (1986) found that users were unlikely to view retrieval sets exceeding 200 items (p. xxxvii), and that users "expressed the need for an online catalog capability to limit search results," and that classification could provide functionality in that area. Some research suggests that providing search results in a classified or categorized display allows users to analyse search results more quickly (Vizine-Goetz and Thompson, 2003). The use of knowledge organization and classificatory-like structures (including computer generated collocations) for this purpose has become of wide interest in the age of online retrieval. The ALCTS (1999) report referred to this function as "Limiting/Partitioning." They describe partitioning being when a retrieval set is returned in a classified arrangement with labeled sub-headings, and limiting being a function of further restricting a result set by class. We note that partitioning is effectively the *surveying* function carried out on a result set, while limiting is related to the *class retrieval* function.

Keyword Match Enhancement

When a user executes a simple keyword search, English words from classification schedules or thesauri attached to bibliographic records will increase the recall of the result set. Markey (1986) calls this type of a search a "Direct search" of subject-enhanced bibliographic records, and notes that combining vocabulary from different knowledge organization systems can enhance recall. This function is least well treated in the literature, but is included here because it seems that the adhoc collocation of

NOTES

documents that results from such a search is distinctly different from the *class retrieval* function, likely requiring different features of the knowledge organization system to support. It is also a function likely to be of special interest in the contemporary environment where users are believed to prefer a keyword search of this type to formal *class retrieval*. Vickery (1971) perhaps touches upon this function when he specifies a function to provide for "the selection of bibliographic records with unique characteristics; for example any record containing a specified string of juxtaposed words, such as 'enzyme activity in mammalian cells.'"

Negotiation

One of the functions of knowledge organization that Vickery (1971) identifies is "to give aid to the searcher in his choice of search terms," the traditional domain of the thesaurus. The CRG (1955) memo suggests that "an information retrieval system should be designed… to help even the ignorant user pass from the vague formulation of a subject in his mind to its precise formulation in the system," associated with the first and second stages in their model of information acquisition. Svenonius (1983) has written that "perspective hierarchies [contained in a classification system] can be used to contextualize the meaning of vague search terms, enabling the computer to simulate in part the negotiation of a search request carried on by a reference librarian." While Cutter (1871) instead identifies a classified arrangement in a single printed catalogue as an obstacle to this function, in that one must be an expert in order to find one's place.

Functions not included in the Present Model

Some functions from the literature have been purposefully left out of this model for now. Vickery (1971) and Svenonius (1983) both write of a function of classification as a mapping/switching language. Vickery mentions as a function to "provide for the automatic conversion of index entries from one form to another". Svenonius (1983) also specifics "representation and retrieval of non-bibliographic information" as a use of classification, which seems just a different context for the same functions identified for bibliographic information, albeit a context which may prioritize functions differently. Svenonius also mentions "automatic retrieval" as a use, which seems to be just a different method of attempting to fulfill the same functions.

Conclusion

Knowledge organization is one among many contemporary fields, which try to play a role in the future environments of communicating and exchanging knowledge. Among the competitors are Knowledge Management and Computer Science. Much knowledge may be shared among such fields, but it is important for each field to develop a clear identity and a history of its own. KO has in particular been connected with LIS and has aimed at supporting learning and research activities, which may be one of the important pillars on which to base the field. Another related pillar is the concept of knowledge and theories of knowledge. Knowledge

organization may have a valuable theoretical base in theory of knowledge, which may be the reason why we should stick to this label as the name of our field.

13.3.1 Folksonomy

NOTES

Folksonomy is the process of using digital content tags for categorization or annotation. It allows users to classify websites, pictures, documents and other forms of data so that content may be easily categorized and located by users.

Folksonomy is also known as social tagging, collaborative tagging, social classification and social bookmarking.

Folksonomy may be broad or narrow. Broad folksonomy provides a wealth of related content data and tags, whereas narrow folksonomy information is limited.

13.3.2 Ontology

The branch of metaphysics (philosophy concerning the overall nature of what things are) is concerned with identifying, in the most general terms, the kinds of things that actually exist. In other words addressing the question: *What is existence? and What is the nature of existence?* When we ask deep questions about "what is the nature of the universe?" or "Is there a god?" or "What happens to us when we die?" or "What principles govern the properties of matter?" we are asking inherently ontological questions.

Check Your Progress

1. How has the 'browsing' function been defined by the Association for Library Collections and Technical Services (ALCTS) report?
2. Mention one function of knowledge organization systems.

13.4 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. The Association for Library Collections and Technical Services (ALCTS) report dated 1999, specifies a "browsing" function as "examining adjacent resources within similar class, or across adjacent classes.
2. Knowledge organization systems can be used to provide one or more useful arranged sequences or orders to a set of documents.

13.5 SUMMARY

- KO as a field of study is concerned with the nature and quality of such Knowledge Organizing Processes (KOP) as well as the Knowledge Organizing Systems (KOS) used to organize documents, document representations, works and concepts.

NOTES

- A book such as Oleson & Voss (1979) *The Organization of knowledge in modern America, 1860-1920* is an example of the study of knowledge organization in the broad sense.
- While Library and Information Science (LIS) is the central discipline concerned with KO in the narrow sense of the word, other disciplines such as the sociology of knowledge, the single sciences and metaphysics are central disciplines concerned with KO in the broader sense of the word.
- Since the 1950s, computer scientists have been working with KO based on certain assumptions, mostly assuming that human classification and indexing will soon be made superfluous.
- In a broad sense, all knowledge organization systems are arguably intended for retrieval, ultimately for pointing to the user toward documents of interest more efficiently than if he were to browse through a random ordering of documents.
- The Association for Library Collections and Technical Services (ALCTS) report dated 1999, specifies a "browsing" function as "examining adjacent resources within similar class, or across adjacent classes.
- The Identification function is served by listing assigned class or term information on a record so that the user knows more about the nature of the document indicated.
- When a user executes a simple keyword search, English words from classification schedules or thesauri attached to bibliographic records will increase the recall of the result set.
- Folksonomy is the process of using digital content tags for categorization or annotation.

13.6 KEY WORDS

- **Folksonomy:** It is the process of using digital content tags for categorization or annotation.
- **Ontology:** It is an organizational system designed to categorize and help explain the relationships between various concepts of science in the same area of knowledge and research.
- **Science Citation Index:** It is citation index originally produced by the Institute for Scientific Information (ISI) and created by Eugene Garfield.
- **Semiotics:** It the study of signs and sign-using behaviour.

NOTES

13.7 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short Answer Questions

1. What is the main area of study of KO?
2. How do knowledge organization systems assist in locating and identifying the documents in traditional classification?

Long Answer Questions

1. What is the main area of study of KO?
2. How do knowledge organization systems assist in locating and identifying the documents in traditional classification?

13.8 FURTHER READINGS

Parkhi, RS. 1960. *Library Classification: Evolution and Dynamic Theory*. Bombay: Asia Publishing House.

Raju A. 1991. *Universal Decimal Classification.* Madras: T.R. Publishers.

Ranganathan SR. 1963. *Colon Classification*. Sixth Edition. Bombay: Asia Publishing House.

Ranganathan, SR. 1965. *Prolegomena to Library Classification,* Second Edition. London: Library Association.