

**Genesis of
Interdisciplinary Subjects in Science
and their
Reflections in Classificatory Devices**

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Introduction

Knowledge is imperative to mankind. Its growth is prerequisite for social, economic, cultural as well as individual progress. It is integral to innovation and creation. The frontiers of human knowledge are continuously expanded and reshaped through the persistent quest to discover what lies beyond the familiar. The pursuit of knowledge by the human mind, its acquisition, storage, organization, retrieval, dissemination, and transmission are therefore vital to ensure the advancement of a society.

As defined by Daniell Bell (1979) knowledge is an “organized set of statements of fact or ideas, presenting a reasoned judgment or an experimental result, which is transmitted to others through some communication medium in some systematic form” (p.168). The universe of knowledge is however vast and constantly growing. Ensuring an unhindered and systematic transmission of knowledge across time and organizing and storing them in a manner that would cater to the information need of every individual is essential but challenging.

Libraries are widely recognized as custodians of knowledge. They have played crucial role in preserving knowledge across generations. Libraries employ various well-structured and systematic tools for organizing knowledge. One such important tool is ‘Library classification schemes’ in which the universe of subject is arranged in accordance with the academic disciplinary demarcations. Traditional subjects that are already established as distinct disciplines have their well-defined boundaries with their respective areas of study visibly different from one another.

The dynamic nature of the universe of knowledge, however, gives rise to new subjects at any point of time. Also, knowledge creation and gaining, technological developments and problem-solving, often necessitates these traditional subjects to interact by crossing their well demarcated disciplinary boundaries in form of shared theories, tools and techniques, expertise etc. What results from this is the emergence of a new area or field of study, which with time develops its own theories, principals, experts; and eventually gives rise to a distinct new interdisciplinary subject and sometimes even to a new discipline. This genesis, growth and development of an interdisciplinary subject require a substantial amount of time and involve multiple stages of interactions. In each of these stages there exists a different typology of relation among the interacting subjects before its final consolidation into a new interdisciplinary subject. The different typology of relations or modes of subject formations for the development of any subject has been discussed in subsequent chapters. As the subject evolves a significant challenge is faced in effectively incorporating these new interdisciplinary subjects into the existing disciplinary framework. Over time, the existing disciplinary boundaries become less distinct, prompting the need to modify the traditional arrangements in which the universe of knowledge is organized. Consequently, for incorporating these subjects into any library classification scheme it becomes essential to understand their interactions, existing relationships, and developmental stages and ensure an appropriate place within the scheme.

Cases of such interdisciplinary interactions among disciplines have been observed several times in Science, Social Science as well as Humanities. Specially in science, interdisciplinary interactions have significantly contributed to the progress of knowledge. The world has witnessed the emergence of new interdisciplinary science subjects, few of which have already established themselves as disciplines.

Existing literary output shows very little evidence on study of genesis, growth, and development of interdisciplinary science subjects and the reflection of the stages of development in the classificatory devices or how far the library classification schemes have incorporated these changes with the course of time. Therefore, a notable knowledge gap has been found in this regard.

Statement of the Problem and Research Questions

For any interdisciplinary subject the relation between the interacting individual subjects

evolves through different stages. This research focused on the genesis and development of selected interdisciplinary subjects in the field of science and its reflection in library classification schemes.

The problem of the proposed research can be stated as:

***A study of genesis of interdisciplinary subjects in science and their reflections in
classificatory devices.***

The problem stated above along with some necessary and relevant research questions emerging therefrom are to be resolved in course of the investigation.

The research questions in this direction are as follows:

- i. How the selected interdisciplinary science subjects developed? What are the major stages? How can they be determined? What methodology should be adopted to this end?
- ii. What typology of relation existed in each of the stages of development of the selected interdisciplinary science subjects? How can they be studied? What methodology should be adopted at this point?
- iii. How the stages of development and typology of relation of the selected interdisciplinary science subjects are reflected in library classification schemes? How can they be determined? What methodology should be adopted in this regard?
- iv. Is there any difference in the coverage of the selected interdisciplinary science subjects in the latest editions of the library classification schemes? How can they be studied? What methodology should be adopted at this point?
- v. How the literary warrant of the selected interdisciplinary science subjects have grown over the years? How can they be determined? What methodology should be adopted in this regard?

Objective

The main objective of the research is to study the genesis of interdisciplinary subjects in science

and their respective reflection in classificatory devices. In doing so the study attempted:

- i. to trace the major stages of development of the selected interdisciplinary science subjects;
- ii. to identify the typology of relations existed at each of the stages of development of the selected interdisciplinary science subjects;
- iii. to trace the reflection of the stages of development and typology of relation of selected interdisciplinary science subjects in library classification schemes;
- iv. to compare the coverage of the selected interdisciplinary science subjects in the latest editions of the library classification schemes;
- v. to study the selected interdisciplinary science subjects in terms of their growth of literary warrant.

Methodology

In order to reach the above stated objective suitable methodology has been applied at each stage of the research. A brief outline of the overall methodology is given below:

For the purpose of fulfilling the objective of this study a method of document research was adopted. Literature search revealed that interdisciplinary subjects are formed through three 'modes of subject formation' viz: Fusion, Distillation and Clustering. A thorough document search was conducted, and an attempt was made to identify interdisciplinary science subjects formed by either of the three modes of subject formation viz: Fusion, Distillation and Clustering.

Extensive scanning and reading of various documents have been done to ascertain the interdisciplinary nature and final mode of formation of the subject. Such documents included general and scientific dictionaries, general and science subject-based encyclopaedias, various science abstracts, thesis and books. Also, specific web resources of respective subjects were consulted. However, as new interdisciplinary science subjects are constantly emerging, it was neither convenient nor possible to cover all interdisciplinary science subjects (formed by the three modes of subject formation) for the fulfilment of the objective.

So, for selecting the sample interdisciplinary science subjects, the latest edition of three library classification schemes viz: Dewey Decimal Classification (23rd edition), Universal Decimal classification (standard edition) and Colon Classification (7th edition) were taken into

consideration. The latest editions of all the three classification schemes were searched exhaustively, and a list of interdisciplinary science subjects was prepared. While doing so only those interdisciplinary subjects that were found to have an assigned class number in any of the three schemes under science; and was formed through either of the three already mentioned ‘modes of subject formation’ was considered.

All the listed subjects under the three modes of subjects’ formation were then tested in terms of their Literary Warrant and a Checklist.

- For finding literary warrant a web survey method was adopted. Number of books available on OCLC World-Cat was traced. Literary warrant on a subject descriptor in the format of ‘Books’ and in all languages have been considered for this data collection. While selecting the subjects the time range of 10 years i.e. 2012-2021 (latest development) and subjects having minimum 500 publications within the above time range was considered.
- The checklist was prepared on the basis of various definitions and developmental study of an interdisciplinary subjects found during the document search.
- The detail of the checklist is given below:

Subject Name:	
Checklist	Yes/ No
Availability of Journals	
Availability of Research Article	
Available Research Group / Department/ Degree Course in Universities	
Conference / Seminar on the Subject or its sub-areas	

Table 1: Sample Checklist

- *Availability of Journals:* Journals were traced on the selected interdisciplinary science subjects if indexed in the Web of Science/ Science Direct / Scopus.
- *Availability of Research Article:* Minimum 1000 published research articles on each of the interdisciplinary science subject were traced in Web of Science/ Science Direct / Scopus in last ten years i.e. (2012-2021).

- *Availability of Research Group / Department / Degree course in Universities:* Department or Degree courses (Graduate or Post-Graduate) available in a university / institute / college were traced. World University ranking of Times Higher Education (2021) was referred while selecting or validating the universities for conducting the search.
- *Conference / Seminar:* Seminars or conference regularly held on the selected interdisciplinary subject or sub-areas in last 5 years i.e., 2017-2021 were traced.

The data collection for the initial selection of the subjects (both for literary warrant and checklist) was done in February 2022 and the data were reverified throughout the course of study and final data was collected on 12-18th June 2024.

Only those interdisciplinary science subjects that were found to fulfil all the criteria of the checklist were considered and arranged in order to decrease the literary warrant.

However, as the list of subjects were still large so for the final selection of the sample, 8 subjects formed by fusion, 2 subjects formed by distillation and 2 subjects formed by clustering modes (constituting approx. 70% of each of the three list separately) were taken into consideration.

The list of the interdisciplinary science subjects along with their final mode of subject formation are given below in an alphabetical order:

Interdisciplinary Science Subjects		Mode
1.	Astrobiology	Fusion
2.	Astrophysics	Fusion
3.	Biochemistry	Fusion
4.	Bioinformatics	Fusion
5.	Biomechanics	Fusion
6.	Biophysics	Fusion
7.	Geochemistry	Fusion
8.	Geophysics	Fusion
9.	Microbiology	Distillation
10.	Molecular Biology	Distillation
11.	Environmental Science	Clustering
12.	Oceanography	Clustering

Table 2: List of subjects

After the selection of the interdisciplinary science subjects, a detailed in-depth document search was conducted to trace the history and landmark development of each of the selected subjects that contributed towards its formation.

For finding the growth in the literary warrant of each of the selected interdisciplinary science subjects a web survey of the number of books available on OCLC World-Cat was done. Literary warrant on a subject descriptor in book formats and in all languages was considered for this data collection. For subjects found in more than one classification scheme the earliest inclusion date was considered.

Here while selecting time range two different criteria were followed:

- For subjects included in previous editions of the classification scheme: 10 years before the subjects first inclusion and 10 before the last published edition of the scheme was considered.
- For subjects included only in the latest edition of the classification schemes: 10 years before and after last published edition of the scheme was taken into consideration.

The three previously mentioned classification schemes were studied to find out inclusion and development of the selected interdisciplinary science subjects. For doing this all the twenty-three editions of Dewey Decimal Classification and seven editions of Colon Classification were investigated for the study. For Universal Decimal Classification three editions viz: 1985 Medium Edition; 1993 Medium Edition Revised; 2005 Standard Edition were examined. The twenty-three editions of DDC, the three editions of UDC and the seven editions of CC have been accessed and studied from Internet Archive; Jadavpur University Central Library; Departmental Library of Library and Information Science department, Jadavpur University; National Library of India and D-Space Repository of Gokhale Institute of Politics and Economics, Pune.

Keeping in view the objective of the study, the data collected were tabulated, analysed and interpreted.

The stages of development of the selected interdisciplinary science subjects were identified from the traced history and landmark developments of the subjects.

The different typology of relation that existed at the various stages of development for each of the selected interdisciplinary science subjects were identified and analysed. The modes of formation were identified after thorough interpretation of the landmark developments.

The identified stages and typology of relations of the selected interdisciplinary science subjects and their reflection through their inclusion and development in the previously mentioned library classification schemes were studied.

An analysis was made of the identified differences in the coverage of the selected interdisciplinary science subjects in the latest editions of the library classification schemes- DDC, UDC, CC.

The growth in the literary warrant of each of the selected interdisciplinary science subjects were studied.

Limitation of Scope

The proposed study had been kept restricted within the twelve selected interdisciplinary science subjects due to time constrain of the researcher. Also, the study was kept limited to three classification schemes namely Dewey Decimal Classification, Universal Decimal Classification and Colon Classification schemes. Due to unavailability of all the editions of Universal Decimal Classification (UDC) only three editions i.e., 1985 Medium Edition; 1993 Medium Edition Revised; 2005 Standard Edition were studied for the research.

Significance of the Study

This study will have significant implications to the understanding of the course of any subject formation and thereby evaluating the appropriateness of the inclusion of new subjects in classification schemes. As the emergence of new subjects especially those interdisciplinary in nature is bound to happen, so it is pertinent to be able to accommodate those subjects within the disciplinary structure of a library classification scheme. However, to provide a new subject a justified position in the schemes, it is necessary to understand the typology of relations that existed between the interacting subjects. Also, it is inevitable that the nature of this relationship will change, and the core focus of a subject might also shift further necessitating a number relocation to suit the scope of the subject aptly. As this study identifies the significant developmental stages of the selected subjects and traces its corresponding reflection in classification schemes, this study will aid in the understanding of the concept of subject formation. Identifying the existing gaps in the process of incorporation will significantly help classificationists, those responsible for regular updation of classification schemes and anybody dealing with classification both in theory and practice.

Style of Reference

The American Psychological Association (APA) citation style is one of many different citation styles. Guidelines of American Psychological Association, 6th ed., 2009 was followed here for citation of print and non-print materials in the text and for making list of references.

Outline of Chapters

The research was presented in the following chapters:

Chapter 1 titled 'Introduction' deals with the problem of the research along with research questions, objectives. It also specifies the limitation of scope, and the methodology adopted to fulfil the objectives. It also discusses the significance of the study.

Chapter 2 titled 'Literature Review' provides a thorough review of the literature in relation to the problem of the research.

Chapter 3 titled 'Interdisciplinary Subjects: An Overview' discusses the concept of interdisciplinary subjects, its characteristics, emergence, modes of formation, and related terms like transdisciplinary, multidisciplinary, cross disciplinary.

Chapter 4 titled 'Classification Schemes: A Brief Account' deals with library classification schemes, its need and focuses on the structure and nature of the selected classification schemes for this study viz: Dewey Decimal Classification, Universal Decimal Classification and Colon Classification.

Chapter 5 titled 'Interdisciplinary Subjects in Science: A Study' gives a detailed analysis of the evolution of each of the subjects, its historical and landmark developments.

Chapter 6 titled 'Reflections in Classificatory Devices' identifies the incorporation of the interdisciplinary science subjects. It traces how far the classification schemes were able to accommodate the newly emerging subjects, how the number allocated to the subjects have been relocated to new class numbers in the course of the evolution of the subject.

Chapter 7 titled 'Data Analysis and Interpretation' focuses on the analysis and interpretation of the collected data to reach the objective of the study.

Chapter 8 titled 'Findings and Conclusion' provides a summary of the findings of the study. Areas of further research have also been suggested here.

Analysis and Interpretation:

- **Stages of developments and typology of relations**

The major stages of developments of interdisciplinary subjects and typology of relation existed at each stage were shown here.

Table 1: Sample table of Stages of developments and typology of relations

Subjects	Stages of developments (Years) and typology of relations (Modes of Formation of Subject)			
Name	Pre-Loose Assemblage	Loose Assemblage	Lamination	Fusion
Astrobiology	Till 1934	1935-1974	1975-1997	1998 Onwards
Astrophysics	Till 1686	1687-1919	1920-1962	1963 Onwards
Biochemistry	Till 1751	1752-1832	1833-1904	1905 Onwards
Biomechanics	Till 1678	1679-1881	1882-1966	1967 Onwards
Biophysics	Till 1785	1786-1888	1889-1956	1957 Onwards
Geochemistry	Till 1762	1763-1903	1904-1949	1950 Onwards
Name	Pre-Lamination	Lamination	Towards Distillation	Distillation
Microbiology	Till 1856	1857-1881	1882-1944	1945 Onwards
Molecular Biology	Till 1921	1922-1943	1944-1960	1961 Onwards
Name	Pre Clustering		Towards Clustering	Clustering
Environmental Science	Till 1926		1927-1970	1971 Onwards
Oceanography	Till 1846		1847-1974	1975 Onwards

The above table reflects the typology of relation that is the modes of subject formation as

identified in each stage of the growth of the selected subjects.

It can be observed that for the interdisciplinary subjects that were ultimately formed through 'Fusion' reflects two more stages viz: Loose Assemblage and Lamination during their formation. However, for each subject the stages are varying. Also, the span for each of the typology of relation is not similar for all subjects. For example, in 'Biochemistry' the period for Loose Assemblage lasted from 1752-1832; Lamination from 1833-1904; and became a Fused subject from 1905 onwards. But for Astrobiology although the three modes are same but its span for Loose Assemblage was from 1935-1974: followed by Lamination from 1975-1997 and finally Fusion from 1988 onwards.

For subjects that came out of Distillation, two distinct 'typology of relations' can be identified 'Lamination' and 'Distillation'. They also reflect an intermediary stage (Towards Distillation) where the subject, although still in the lamination mode shows enough evidence that Distillation might take place.

In subjects formed out of Clustering the stages of development included a Pre-clustering and Towards clustering stage that ultimately led to the final mode that is 'Clustering' of the subject. In case of a clustered subject as the subjects initially developed under different individual science subjects so identifying a particular typology of relation at a given timeframe is not possible. Any entity after being studied for a prolonged period in different subjects gains certain literary warrant that ultimately leads to the emergence of a new interdisciplinary subject clustered around the entity studied.

So, it is evident that any interdisciplinary interaction has their own course of genesis and development, that they go through, to come out as a distinct interdisciplinary subject.

- **Reflections of Typology of relations in Classificatory devices**

In Chapter 6 it is observed that a subject gets reflected in a classification scheme by varied class number across their edition. The reason for such relocations is generally development in the scope of the subject.

The following sections focus on making a comparative study of the typology of relation identified for each of the subjects in chapter 5 to the coverage of the subjects in the three classification schemes as reflected in chapter 6.

Below is the analysis of two sample subjects viz: Astrobiology and Astrophysics:

Astrobiology:

- The subject Astrobiology initially got reflected by the term 'Plurality of the world' in DDC from its 1st to 16th edition that is till 1958. The tracing of the history of the subject reveals that the concept of plurality of world was practiced before the scientific concept of Astrobiology emerged. From 1935-1974 the subject astrobiology was in a state of Loose Assemblage. It was during this period that the term got included in the 17th edition of DDC that is in the year 1965 under the main class Astronomy. However, at the end of this period the class number got shifted to 574.99 under the main class Biology. History of the subjects reveals that around this period the focus of Astrobiology was to identify extra-terrestrial life. Thus, the class number representing Geographic treatment of extraterrestrial life is to a greater extent in conformity with the subject development. In 1996 the class number again got shifted to 576.839 representing extraterrestrial life under 'Origin of life'. At this period the typology of relation identified is of 'Lamination' and the study involved possibility of life and survival in other planets. The period of fusion began in 1998 however the class number remained unchanged.
- No reflection was found in UDC and CC.

Astrophysics:

- In DDC, Astrophysics first entered as index entry (year 1911) having the class number 523, when the subject was itself in Loose Aassemblage period. Studies mostly involved spectroscopic observation, measurement of stellar parallax as well as stellar spectra classification. The growth in observational data led to the inclusion of the subject from 15th ed. (year 1951) in the main schedule having the same class number. During this period the subject reflects a 'Lamination' stage of subject formation when x-ray astronomy, nuclear astronomy as well as radio astronomy was at its peak. In 1963 the Fusion mode of Astrophysics began and in the 17th edition the class number got relocated to 523.013 under Physical and Chemical aspects of celestial bodies.
- In UDC in Astrophysics was included in 1985
- In CC it got added in 1933 from its first edition when it was added as a compound

subject and the typology of relation was ‘lamination’. In the 7th edition it got reflected as a basic subject when the typology of relation was of ‘Fusion’.

The details of the other subject comparison have been given in Chapter 7 of the thesis.

- **Comparison of latest editions of Classification Schemes**

- The latest editions of the three selected library classifications schemes are compared here (using data of chapter 6) to observe the differences present in the coverage of the subjects selected for the study.

Table 43: Comparison of latest editions of Classification Schemes

Subjects	Library Classification Scheme		
	DDC (2011)	UDC (2005)	CC (1987)
Astrobiology	✓	x	x
Astrophysics	✓	✓	✓
Biochemistry	✓	✓	✓
Bioinformatics	x	✓	x
Biomechanics	✓	x	x
Biophysics	✓	✓	✓
Environmental Sciences	x	✓	x
Geochemistry	✓	✓	x
Geophysics	✓	✓	✓
Microbiology	✓	✓	✓
Molecular Biology	✓	✓	x
Oceanography	✓	✓	✓

- From the above table it is observed that out of 12 subjects both DDC 23rd and UDC Standard Edition includes 10 subjects, whereas CC includes only 6 subjects. Although DDC and UDC covered the same number of subjects however the subjects covered by them vary.
- The two interdisciplinary science subject that was not covered by DDC are Bioinformatics and Environmental Science. On the other hand, UDC did not cover Astrobiology and Biomechanics.
- Colon Classification 7th edition included only 6 interdisciplinary science subjects viz: Astrophysics, Biochemistry, Biophysics, Geophysics, Microbiology and Oceanography.

- So as far as the latest edition of the classification schemes are concerned it is evident that DDC and UDC had the maximum coverage of Subjects. However, none of them are updated enough to accommodate all the interdisciplinary subjects.
- **Growth of Literary Warrant**

In this section the growth of books on an interdisciplinary subject was tested in OCLC Worldcat. The growth of this literary warrant will help to understand the growth of the subject over time.

Table 3: Growth of Literary Warrant

Subject	1 st inclusion year (DDC/UDC/CC)	No. of books 10 years before 1 st inclusion		Last inclusion year (DDC/UDC/CC)	No. of books 10 years before last inclusion	
		1955-1964	16		2001-2010	1252
Astrobiology	1965 (DDC)	1955-1964	16	2011 (DDC)	2001-2010	1252
Astrophysics	1911 (DDC)	1901-1910	132	2011 (DDC)	2001-2010	17265
Biochemistry	1932 (DDC)	1922-1931	776	2011 (DDC)	2001-2010	34974
Bioinformatics	2005 (UDC latest edition)	1995-2004	4117	2005 UDC (latest edition)	2006-2015 (no. of books 10 years after last inclusion)	20402
Biomechanics	1971 (DDC)	1961-70	503	2011 (DDC)	2001-2010	7633

Biophysics	1932 (DDC)	1922-31	86	2011 (DDC)	2001-2010	8421
Environmental Sciences	1985 (UDC)	1975-1984	4645	2005 (UDC)	1995-2004	11847
Geochemistry	1919 (DDC)	1909-1918	66	2011 (DDC)	2001-2010	10638
Geophysics	1919 (DDC)	1909-1918	131	2011 (DDC)	2001-2010	12832
Microbiology	1951 (DDC)	1941-1950	1101	2011 (DDC)	2001-2010	30282
Molecular Biology	1971 (DDC)	1961-1970	4395	2011 (DDC)	2001-2010	53805
Oceanography	1942 (DDC)	1932-1941	755	2011 (DDC)	2001-2010	17904

The above table shows that in the span of 10 years prior to its inclusion in DDC the subject 'Astrobiology' had only 16 books in the WorldCat whereas in the span of 10 years before the latest edition it had 1252 books. For Astrophysics the number of books prior to its first inclusion was 132 which increased to 17265 for the span of 10 years before the latest edition. For Biochemistry the growth has been from 776 to 34974 books.

Similarly, the growth for Biomechanics has been from 503 to 7633; for Biophysics from 86 to 8421; for EVS from 4645 to 11847; for Geochemistry from 66 to 10638; Geophysics 131 to 12832; Microbiology 1101 to 30282; Molecular Biology from 4395 to 53805 and Oceanography from 75 to 17904.

The only exception made here was for the subject Bioinformatics as it has been included only in the latest edition of UDC. So, as declared in the methodology 10 years before and after of the year of publication of the UDC standard edition was considered. However, still a tremendous growth in literary warrant can be observed even in such a short span of time.

Therefore, growth in literary warrant can be observed for each of the selected interdisciplinary subjects. Also, some of the subjects viz Microbiology, Molecular Biology, Biomechanics and Geochemistry has reflected unprecedented growth in their literary warrant.

Findings

The findings drawn from the research are summarized below:

- From the study of the development of the selected interdisciplinary science subjects it is observed that the genesis of the interdisciplinary subjects varies. While the origin of subjects like astrobiology, astrophysics, biochemistry, biophysics, biomechanics, geochemistry, geophysics, microbiology, oceanography, environmental science, can be traced to antiquity; subjects like bioinformatics molecular biology are comparatively new. As a result, the stages and the span of the development identified for each of the subject differ from one another. However, the final stage of development of the above-mentioned subjects as distinct interdisciplinary science subjects came in the 20th century.
- Interdisciplinary science subjects developed by following ‘modes of formation of subjects’ (as mentioned earlier). The study reveals that the typology of relation varies from one subject to another. The initial typology of relation for fused interdisciplinary science subjects has been identified as ‘loose assemblage’; the distilled subjects went through ‘lamination’. Few subjects also witnessed an overlapping of typology of relations in this case ‘lamination’ and ‘fission’. Going through the above typology of relation they reached either fusion/distillation/clustering. In each of the relation

depending upon the interaction the subjects formed where either complex or compound or primary basic subject.

- The landmark developments, the stages of development and the typology of relations have an impact on the inclusion of any interdisciplinary science subject in classificatory devices. The development of the subjects leads to its inclusion and relocation of position due to the progress of the subject in classification schemes. However, it has been observed that there exists a considerable time gap in the development of the subject and its inclusion. Also, the gap in between the publications of new editions results into delay of any relocation of class number in classification schemes when needed.
- None of the selected library classification scheme has included all the subjects in their latest edition. Among them DDC covers 10 subjects except bioinformatics and environmental science; UDC covers 10 subjects except astrobiology, biomechanics; CC covers only 6 subjects viz: astrophysics, biochemistry, biophysics, geophysics, microbiology and Oceanography.
- The literary growth for each of the selected subject varies from one another. However considerable growth is found for all the subjects. Subjects like molecular biology biochemistry microbiology show good growth in their literary warrant.

Conclusion

The study of the genesis and development of a subject offers an idea of how any subject grows with time. In case of interdisciplinary subjects, the growth involves interactions with other subjects by crossing the rigid boundaries. These interactions lead to the emergence of new subject fields that may establish themselves as a distinct discipline. The research carried out above shows such interactions among science subjects that have eventually led to the coming up of the selected interdisciplinary subjects. Such insights also play an important role in inclusion and relocation of the subjects in classificatory devices. The research revealed that the inclusion of any subject in classificatory devices requires a significant growth in its scope as well as in its literary warrant.

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