Modes of Growth of Subjects†

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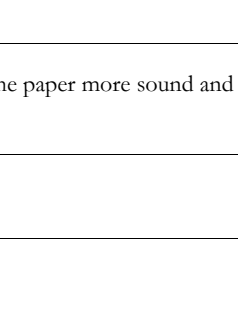
M. P. Satija, Devika P. Madalli, Biswanath Dutta. **Modes of Growth of Subjects.** *Knowledge Organization. 41(3)*, 195-204. 46 references.

Abstract: We define knowledge as a system in a perpetually dynamic continuum. Knowledge grows as it is always fragmentary, though quantifying this growth is nearly impossible. Growth, inherent in the nature of knowledge, is natural, planned, and induced. S.R. Ranganathan elucidated the various modes of growth of subjects, viz. fission, lamination, loose assemblage, fusion, distillation, partial comprehensions, and subject bundles. The present study adds a few more modes of developments of subjects. We describe and fit these modes of growth in the framework of growth by specialization, interdisciplinary and multidisciplinary growths. We also examine emergence of online domains such as web directories and focus on possible modes of formation of such domains. The paper concludes that new modes may emerge in the future in consonance with the new research trends and ever-changing social needs.



† We are grateful to the two anonymous but learned referees for their studied constructive suggestions to make the paper more sound and also bringing some relevant studies into our notice, which have been incorporated in the revised draft.

Received 11 June 2013; Revised 31 January 2014; Accepted 31 January 2014

Keywords: knowledge, subjects, growth, Ranganathan

1.0 Growth of Knowledge

Every system and entity in this universe is growing and changing. The universe of knowledge is a system, and like every system it grows. Growth of knowledge is both additive, as in humanities, and cumulative, as in sciences (Dogan 2001a, 11025). S.R. Ranganathan's fifth law of library science, *viz.* library is a growing organism, is a simple bibliothecal manifestation of this impeccable law of growth of knowledge. Kevin McGarry (1993) aptly equates this growth to biological growth. Today this growth rate is unprecedented and alarming. We are obviously witnessing an information deluge—though it is not easy to quantify the volume of knowledge or its speed of growth (Machlup 1979). However, as measured through the quantity of literature, scientific literature grows annually at the rate of 5 to 15% and thus doubles between 5 to 15 years, writes a director of Chemical Abstract Service (Satija 1984). In some areas of soft sciences, such as humanities, knowledge growth is slow, so is the rate of obsolescence. We however see a palpable growth of knowledge in all areas of human thought and endeavours. The growth may be of three types:

1.1 Natural Growth

Paul Weiss (1960) and S.R. Ranganathan (1963, 449) liken knowledge growth to the growth and development of a living organism; so does Kevin McGarry (1993, 146). Thus, knowledge grows without any conscious efforts, as in a forest, provided the environment is not inimical. In every age and society there are curious and restless souls engaged of their own in knowledge creation. This continuous growth makes knowledge a system in a dynamic continuum. Every system needs information feed for its stability and development. This is true even of a homeostatic stage. It means knowledge needs further knowledge for preservation and dissemination of the existing stock of knowledge—thus adding to the existing stock; hence, it grows of its own. Another factor for growth of knowledge is the innate curiosity, the urge to be held in high esteem, and the spirit of adventure and exploration in human beings. Next to food, shelter and security, what humans want is to know the unknown. This quest is known to drive humans to life risking adventures to explore the deep secrets of raw Nature. It is a motivating force to generate and store knowledge. Weiss (1960, 1718) is apt to say that "a key agent in the growth of knowledge has always been the human mind, imaginative, critical and integrative."

Another natural reason is inherent in the fragmentary nature of knowledge. By nature, knowledge is never complete or final. It is an inexhaustible resource. For example, any research inquiry is always open-ended. This is too obvious from the fact that every worthwhile piece of research raises more questions than it answers. Ironically, advancing knowledge holds a mirror to some areas of our ignorance (Smirensky 1994). Hence, knowledge is always incomplete, whatsoever may be added to its huge and inestimable repertoire. It is always moving towards its ever-advancing frontiers. Hence, it has an infinitely innate capacity to grow forever and ever (Weiss, 1960). This growth is both quantitative and qualitative. Qualitative growth leads to refinement and precision or corrects our existing world view. It also fills known gaps in our knowledge. Quantitative growth opens new frontiers and increases its boundaries in all directions.

1.2 Planned growth

No society, no nation can achieve success in economic, cultural, technological and educational welfare activities if the production and consumption of knowledge is not up to a certain optimum level (Satija 2013). Since the Industrial Revolution, knowledge-based innovations have been prized by every society for leading ultimately to economic growth, which further fuels new social and political ideas for welfare, dignity of life and individual justice to mankind (Al-Hawamdeh 2005). Every new piece of knowledge translates into wealth creation to enrich life on this planet and brings social benefits. It is essentially the true capital of economy. Knowledge production, as a major economic sector, is now a reality (Cornforth 1955, 206). Alvin Toffler (1980, 172) is apt to say that: "Information has become perhaps the world's fastest growing and most important business." Therefore, there are planned and organized national and international efforts for its growth. India's National Knowledge Commission (NKC 2005-2008) is a shining example of national plans for development and harnessing knowledge for overall social development. Research is publically financed for new ideas, both basic and applied. Population pressure, rising standards of living and quickly eroding natural resources to sustain economic growth make it imperative to supplement natural resources by artificial ones, and to explore new kinds of natural but renewable resources. This requires further research to make life secure and ensure growth on this planet. This gives rise to an abundant growth in cultivated knowledge. Indeed the growth of knowledge is exponential, and needs to be so. Within a decade, the number of universities in India has increased three-fold, and colleges many more.

1.3 Induced growth

Induced growth of knowledge lies half way between the natural and planned methods. Knowledge is not a com-

modity in the sense that it is decimated by consumption. We can eat our knowledge cake and multiply it too at the same time. In fact, the more we consume the more it grows and multiplies. Gaining or communicating knowledge further facilitates the growth of knowledge. Fritz Machlup equates knowledge dissemination to its growth (1962, 4). Widespread education, social awareness, more leisure time, wonderful advances in information and educational technology, super fast means of communication, generous financial support from governments, organized research, an increase in number and variety of information media, and growth in library and information services are some of the congenial factors which induce the growth of knowledge. Immense pressure on the academicians to "publish or perish," personal rivalries and corporate wars for priority claims, are some other such factors. Post World War II the Cold War, especially since the launch of Sputnik, generated lot of research-based knowledge in defense and social welfare among nations and their political blocks across the Atlantic (Bhattacharya 2012). Close interaction between scholars, specialization trends, teamwork and interdisciplinary studies have also induced the growth of knowledge. In fact all of these are both the cause and effect of the continued growth of knowledge.

2.0 Modes of knowledge and growth

Knowledge is essentially a cerebral construct though social in character, and only the socially available or public knowledge is knowledge *ipso facto*. Factors and means to procreate knowledge are numerous and varied. Nature is the ultimate source, and human beings are the only agents to unearth knowledge. Non-human creatures do not have this creative facility. Research is one process to increase the fund of knowledge. Intuition, imagination and apperception are transcendental ways to conceive knowledge, whereas experimental, empirical, and speculative methods are available to all. Studies on the nature of knowledge have given rise to a body of knowledge called social epistemology (Shera 1962).

In spite of the increased importance of epistemological studies in philosophy, psychology, metaphysics, sociology, economics, education, genetics, linguistics, research methodology, cybernetics, artificial intelligence, and of course information science, surprisingly, there have been very few studies on the mode of topology of growth of subjects. "We do not take enough notice of what contemporary philosophers and scientists have to say about the nature of knowledge," aptly warned Foskett (1980, 3). Knowledge is a librarian's stock-in-trade, and the study of its nature is of as much importance to us as the study of anatomy to a surgeon (Machlup 1962, 33-34). Its implications in information management are all pervasive and too numerous (McGarry 1993). In information science, S.R. Ranganathan (1892-1972) is a pioneer in the studies on the modes of knowledge growth and on the science of knowledge. In the year 1948 Ranganathan got introduced to a paper "Development and structure of the universe of subjects" (Ranganathan 1967b, 293) in the postgraduate library science curriculum of the University of Delhi, but his announced book on the subject was never published. However, he had an abiding interest in the field and always obtained fresh results (Kemp 1976, 11; Ranganathan 1968). The work has been continued by his colleagues at the Documentation Research and Training Centre at Bangalore (Neelameghan 1973a; Neelameghan 1973b; Gopinath and Seetharama 1979) and elsewhere (Puranik 1952; Vickery 1952; Kabir et al. 1996). The late Jesse H. Shera (1903-1982) lauded this as Ranganathan's "intellectual contribution to the underlying philosophy of librarianship" (1962, 106-07).

3.0 Three modes

All the specific modes Ranganathan discovered and a few more for the growth of knowledge can summarily be discussed under three general modes: growth by specialization, interdisciplinary, and multidisciplinary growth. In fact Ranganathan studied growth of knowledge not qua knowledge but in form of subjects and especially the main classes. He defines main class as the first division of the entire mass of knowledge into manageable block of interrelated and coherent ideas for study and communication. He further warns (Ranganathan 1960, 1.41, rule no. 1105), "Generally speaking a main class cannot be represented either as a subclass of another or as a combination of two or more of the main classes." Ranganathan categorized all the subjects in the universe of knowledge into three categories namely, basic, compound and complex. Main classes are basic subjects. Compound subjects virtually infinite in number are basic subjects with a focus such as agriculture of wheat, or rural sociology. Complex subjects are two-phased subjects such as psychology for nurses. However, he divides main classes which he terms them as basic subjects (BS) into the following categories: primary (BS) and non-primary (BS) (Satija 2011, 10-11) .

3.1 Specialization trends

In the beginning was the chaos. When too much growth and vast expansions make a subject unwieldy then the only way left to study and perpetuate it is by fragmentation. In many disciplines of knowledge there is an increasing tendency to specialize; to know more and more about less and less. "Fragmentation and specialization are two faces of the

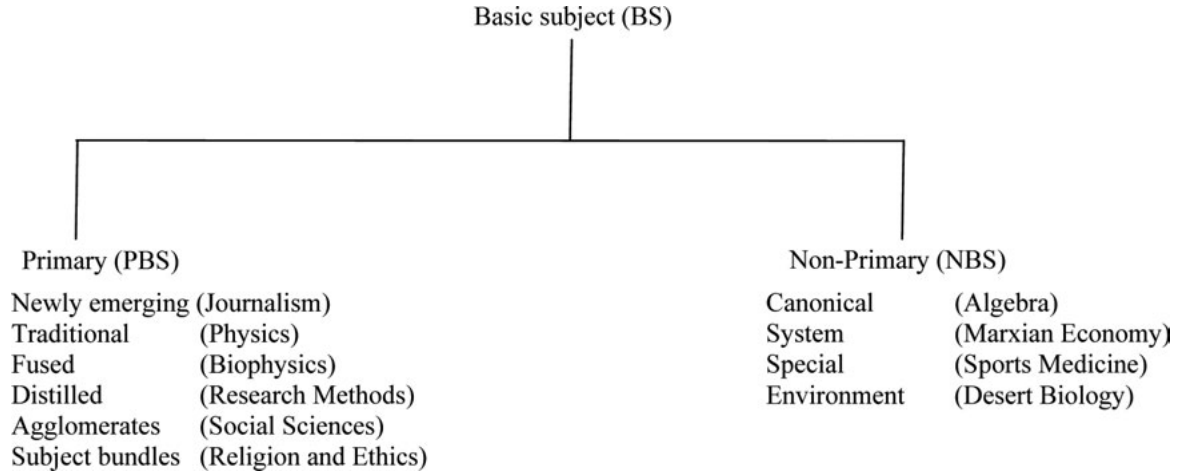


Figure 1. Schema for primary and non-primary Basic Subjects with examples

same coin" (Dogan 2001b, 14851). A specialist is one who knows more and more about less and less till he knows everything about a minuscule part. McGarry (1993, 141) aptly writes:

> Societies cannot afford to work on the principle that everybody can do anything. The basis for efficiency lies in planned specialization of function, so management experts tell us. This principle is the same whether it is in industrial management or in the world of learning. 'Medicine' reflects this specialization function to even greater extent, and the same theory pervades social planning. The common welfare is seemed where each person performs a specialized service for benefit of others, and in turn can rely on their specialized services.

Division of labour in the society is a simple outcome of expansion and sophistication. Specialists emerge, as if spontaneously, when a community becomes large. For example, every large religion fragments into sects, and a large community into ideological groups (Kemp 1976, 103). Similarly in academic fields, a narrower area is made the focus of sharp and intensive studies. Today scientists are no more scientists but physicists, chemists, biologists and so on. This trend does not stop here, still narrower or super specialization has become the order of the day. One hardly knows a physicist today except as nuclear physicist, theoretical physicist, and low-temperature physicist and the like. Generalists are so rare that they have become specialists in themselves. Such fissiparous tendencies in every discipline have acquired significant dimensions. This rather perverse specialization as deemed by some, though not conducive to the balanced growth, nevertheless, yields bumper crops of knowledge which is relevant to social needs. Specialization is the 'in' thing in this populous and sophisticated society and the universe of knowledge. Specialists are proud people. "Specialization is celebrated as a mark of competence" says Dogan (p. 14851). Specializations may have modes of emergence as follows.

3.1.1 Fission

As the term from nuclear physics suggests it is successive ceaseless breaking of the subject into smaller fragments as in a nuclear chain reaction. It happens through the following two ways depending upon the time taken and the size to which the fragments are broken.

3.1.2 Dissection

One time splitting of a subject into an immediate array of its subordinate fragments of equal ranks is called dissection. Cutting a whole loaf of bread into slices (of more or less equal thickness) is dissection. Division of physics into its traditional branches such as properties of matter, heat, light, sound, electricity is an example of dissection. Division of the earth into its constituent seven continents is another example of dissection, so is the political division of a country in to its provinces. Generated divisions have a common genus, are mutually exclusive, exhaustive and equally ranked. In simple words, all segments form an array of cognate classes/entities. The dissection process is horizontal and instantaneous in action. Sometimes Ranganathan termed dissection by fission itself (Ranganathan 1972).

3.1.3 Denudation

Long drawn and repeated dissection of a single entity becomes denudation. It is stripping a subject, like peeling an onion, of its successive layers to reach the bottom of the

bottomless. Sciences, physical sciences, chemistry, organic chemistry, aromatic compounds, benzenoids, benzene and so on illustrate the denudation at work. It works vertically downwards and generates a chain of entities in successive subordination. Its action is prolonged. Extension of the subject decreases while its intension increases in the process. It may be noted that dissection and denudation both are relative terms differing only in degree (Ranganathan 1967a, section PD4). Denudation is dissection applied repeatedly on one entity. Therefore, denudation includes dissection. This process is at work especially since the scientific revolution of 17th century when all experimental sciences were termed by a common term "Natural Philosophy" and once all social sciences were called sociology (Dewey 1876).

3.1.4 Lamination

A main class is a large, diffused but somewhat coherent area of knowledge. When its area of study is limited by specifying topics, it becomes a compound subject, from a basic subject. Lamination is the process of placing one or more isolates on the parent basic subject. English language, linguistic grammar, and English grammar are three examples of laminated subjects from the main class linguistics. These have been obtained by placing the laminae of "English," "grammar," and "English grammar" respectively on the basic subject "Linguistics." These are termed as compound subjects in Ranganathan's terminology. Number of laminae placed on a subject could be as large as feasible. Number of such laminae is a direct measure of the specialization of that topic. Laminated or compound subjects are most populous in this universe of subjects—virtually these are infinite. A faceted classification such as the CC, UDC or BC-2 makes the structure of a compound subject quite clear whereas in the enumerative classification like the DDC compound subjects can neither take many laminae nor is their structure visible. In fact it is another kind of specialization—by qualifying and specifying a fissioned subject.

3.1.5 Procreation

If knowledge grows organically then some of it might be procreated by copulation of two subjects. One such subject is linguistics, which is a knowledge field of recent and rapid growth says McGarry. He further writes (1993, 146):

> Claiming descent from a union of philosophy and philology, it became a widely taught subject in the early 1960s. It claimed territory in the scientific study of human language and this claim was supported by the increasing need to investigate language and communication in relation to human needs and human behaviour ... A group of brilliant theoreticians created a new and broader picture for students and scholars. The discipline soon began to diversify and fuse with other disciplines. The results are specialist studies such as psycholinguistics, sociolinguistics, and neuro-linguistics.

3.1.6 Self-procreated

Furthering the analogy of knowledge bio-organism some organisms like the bisexuals are self-procreated. Applied mathematics, applied physics, applied optics, applied chemistry, human biology are a few of numerous such subjects being taught as independent disciplines. Though every knowledge is applied, they say every mature knowledge is theoretical. Indeed a theory is the most applied knowledge. These subjects are not applied in the sense of technology, as applied chemistry is not chemical technology.

3.1.7 Analogical mode

Some subjects find parallels in other disciplines. For example, Darwin's theory of the evolution of species and survival of the fittest found echoes in social institutions and processes. Society, its organs and institutions evolve, grow and even mutate into other forms. Such studies are aptly described by the term "social Darwinism." Social Darwinism has been used to illuminate and explicate many social phenomena and problems. Social physics, social entropy and political dynamics are some of the examples of such subjects.

3.1.8 Instrument-based subjects

Some subjects are based on a machine and have grown into full discipline by gathering around a machine or device. An example is microscopy or microbiology which has risen from the microscope. But the most outstanding example is of the all pervasive discipline of computer science and engineering and of late mobile-based applications. It has encompassed and influenced every strata of society. Such subjects are growing and even fragmenting, for example, Internet studies is emerging as an independent subject.

3.2 Interdisciplinary growth

The trend of specialization got so perverse that the scholars became isolated and distant from one another. Subjects became too jargon-ridden to be easily communicated to other scholars. McGarry (1993, 164) argues: "This tendency, though it makes for greater efficiency,

can lead to communication problems, to individual researchers losing sense of the 'whole.' In practical terms it can lead to costly duplication of efforts. It can even lead to duplication of efforts within the same profession." Reporting on the proceedings of a World Conference on interdisciplinarity, Judge (1995, 82) reports: "However there was a clear concern that the fragmentation of the disciplines was failing to serve society in the face of a complex of global problem and conflicting initiatives."

This trend has happily been counter-balanced by interdisciplinary studies, set in especially after the last World War (Puranik 1952). Team and relay research, close cooperation among scholars, availability of subject consultants, have led the scholars to join hands for interdisciplinary studies. Knowledge advances through the juxtaposition of subjects. It has been aptly said that subjects criss-cross in boundaries and neat demarcations are now gone. There is inter- and cross-breeding to produce new species of subjects. Then there are subjects like "physical education" which feed on the other subjects in the environment. Interdisciplinary subjects may be defined as a subject of interest to scholars from different disciplines or vice-versa. Ranganathan isolated the following modes of their formation.

3.2.1 Loose assemblage

Loose assemblage is a combination of two or more subjects or their parts in a sort of temporary, casual or incidental way involving any relation viz, influencing, comparison, biasing, difference, tool, or any undefined one. These subjects are from different disciplines. For example, "statistics for librarians," "psychology for nurses," or "influence of computers on library operations" are some such subjects taken at random. In such cases a subject is studied in light of the other and here their encounter or assemblage is temporary ad hoc or loose, and reversible. Inevitably these subjects are of interdisciplinary interest. We can have limitless number of subjects by this process. Subjects formed by loose assemblage are termed as complex subjects by Ranganathan. Each constituent of a complex subject is termed as a phase. Phase relation is counted among Ranganathan's brilliant devices for subject analysis and depth classification of interdisciplinary subjects. Some of its methods such as the tool and bias phase have been borrowed by other systems such as the *Dewey Decimal Classification*, Broad System of Ordering and Bliss' Bibliographic Classification-2 (Slavic 2008).

3.2.2 Fusion

Fusion is an advanced stage of loose assemblage. When loose assemblage solidifies into a permanent relation and the different constituents are irreversibly joined to form an entirely new subject with its own special isolates and literary warrant, it is called a fused subject or a subject born by fusion. Here the friendship of loose assemblage is upgraded to marriage or permanent bonding. Fused subjects transcend complex classes to become basic subjects. Biophysics biochemistry, geopolitics, agricultural economics are a few random examples of homogeneous and irreversibly combined complex classes—called fused main subjects. Fusion as a mode of formation of subjects has been isolated as recently as 1968, though the phenomenon is much older (Ranganathan 1962). In fact, earlier loose assemblage included fusion. Later in 1968 the loose assemblage and fusion were viewed as two different modes of formations.

3.3 Multidisciplinary growth

During the last year of his life in association with colleagues at the Documentation Research and Training Centre at the Indian Statistical Institute, Bangalore (established in 1962), Ranganathan isolated three more modes of formation of subjects. These are all multidisciplinary in nature in accordance with the latest trends in research. Area- or mission-oriented or marginalised social groups, such as women, *dalit* studies, family studies, early childhood studies being the latest fashion in research are a major cause for the outbreak of such subjects which are mostly of applied nature. Teamwork and interaction of pure and applied research also give birth to such subjects. These modes are as described below:

3.3.1 Distillation

When relatively not so fully developed a technique finds applications in different disciplines and as a result it gets more developed and accumulates a body of its own literature "distilled" out of its different applications. When such a technique acquires sufficient literature, then it gets the status of a new main class in itself, and it is termed as distilled main (basic) class. Such main classes are slow in formation. Museology, management science, career-ology, archeology, seminar technique and research methodology are some of the examples of distilled main classes in the Colon classification (Ranganathan 1987, section DE13, 66). These are new entries to the array of main classes. These are born multidisciplinary in the sense that such subjects have been nurtured on the experience of different disciplines or they inherit the genes of different subjects to make a new organism, which is mostly applied in nature.

3.3.2 Partial comprehensions / agglomerates

Out of courtesy to tradition, and many a time out of necessity, some basic subjects coordinate in rank have appeared coupled together. These are neither loosely assembled nor fused. So in their intra-relations these are inert subjects. Plant sciences (botany, agriculture, horticulture, forestry) mathematical and physical sciences, humanities, religion and philosophy, religion and ethics, geography and history are some examples of partially comprehensive subjects. Usually the constituents of a partially comprehensive class are consecutive main classes held under an umbrella. These are also of generic nature, e.g., social sciences, life sciences. In the Colon classification these are now existing at many hierarchical levels. Agglomerates may be viewed as bringing together of fissioned subjects. This phenomenon is already viewed by Kedrov (1974, 3) who writes: "The integration of sciences is today effected to an ever greater degree through their further differentiation." "What is now partial comprehension might have been a main subject in the very early days, before fission advanced sufficiently," says Ranganathan (Ranganathan 1972, 10). Such subjects are usually embodied in periodical publications and encyclopaedias. Partial comprehensive subjects are also termed as agglomerates in new terminology (Gopinath and Seetharama 1979, section 42j). Partially comprehensive subjects do not have their direct isolates. Though their subdivisions in the form of main classes are there like in a "bunch of bananas" held together by some commonality; they are only good neighbours having a common distant forefather.

3.3.3 Subject bundles

As per Ranganathan and Gopinath, the subject bundles comprehend subjects drawn from different disciplines pursued by a team of different specialists (Ranganathan 1987, section DF1, 68). The Gulbenkian Commission accepting the emergence and social relevance of such subjects has now recommended (103, italics original):

> *The expansion of institutions, within or allied to the universities, which would bring together scholars for a year's work in common around specific urgent themes.* They already exist, of course, but in far too limited a number. One possible model is the ZiF (Zentrum für interdisziplinäre Forschung) at Bielefeld University in Germany, which has done this since the 1970's. Recent topics for the year have included body and soul, sociological and biological models of change, utopias.

Such subjects are related and either find application in other subjects, or work in unison with each other subjects towards a common goal. They are not inert to one another. Usually these are area- or mission-oriented studies; and usually such subjects are of applied nature. These may be in the form of a project undertaken by a widely based research team. These projects fall in the domain of "big" science. Every expert or his group has a demarcated area of work at the initial stages. Some of the subject bundles enumerated in the CC-7 (Colon Classification Ed. 7) are: surface science, social science, material science, earth science, hydro science, ocean science, deep sea science, atmosphere science, defence science (Ranganathan 1987). Tennese Valley Project, Antarctic expeditions, Gandhiana, Indology, Sinology, Middle East studies are some practical examples of subject bundles. These are also called subject clusters (Gopinath and Seetharama, 1979, section 42R, 124). These subjects are beginning to have literary warrant. One actual publication cited by Ranganathan and Gopinath (Ranganathan 1987) is: *Indian Ocean expedition: Recent progress in surface sciences,* 1964.

For such subjects Whitley (1984, 206-7) uses the term "fragmented adhocracies" which are polycentric in nature. These subjects are weakly bound. "Research is rather divergent and … limited in its interconnectedness." Professionalization of social sciences has also given a fillip to such studies. Ranganathan erroneously thinks that partial comprehensions and subject bundles are the fruits of new developments in book production (Ranganathan 1969 204). In other words he thinks such subjects have been procreated more by the publishers than the researchers and educationists. In our view, it cannot be so. It is the research trends or social needs which exercise formative influence on the publishing industry, and not vice-versa. Research trends are catapulted by social needs. For example, subject bundles have come into being because of social necessity and availability of huge funds. Publishers only follow the lead given by author, editors and researchers.

3.3.4 Annexation mode

Geography is a good example of how all subject "areas that grow by accretion or colonization...it has annexed many loosely defended positions in the social and human sciences" writes McGarry (1993, 146). This imperialist tendency of geography is visible in its branches such as commercial geography, medical geography, political geography and many more. Take another example of physical education, including sports and aerobics, which draw its sustenance from physical, bio and social sciences. Knowledge and research methods from the hard sciences and mathematics have strongly influenced developments in exercise physiology, kinaesthetic and sport biomechanics.

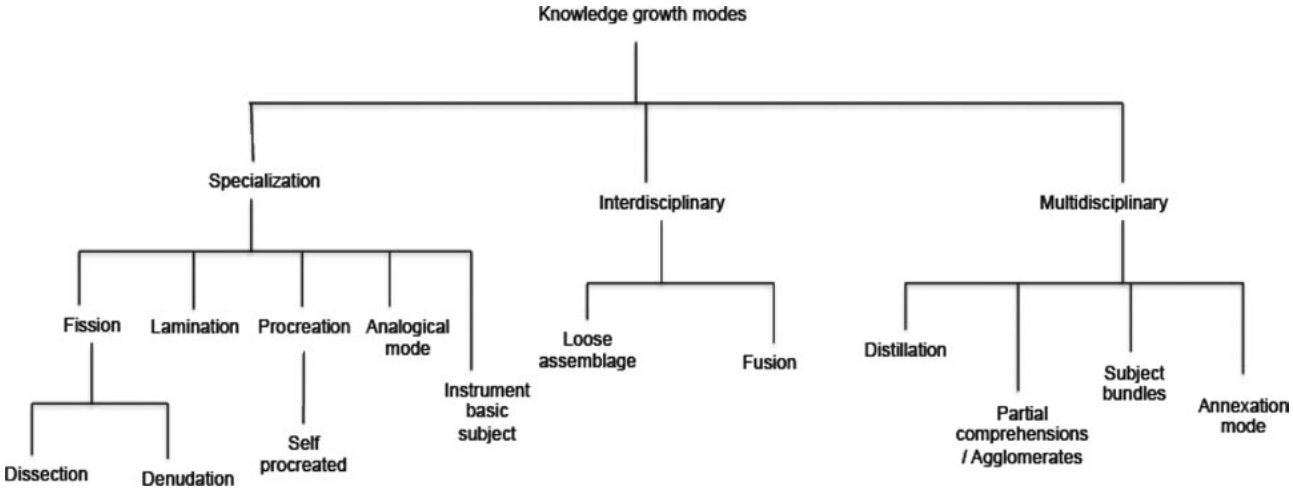


Figure. 2. A schematic diagram of the modes of knowledge growth

Physiology, sociology, history and philosophy formed the foundation for development of exercise physiology kinematics, sport psychology, motor learning. Sport sociology, sport history and sport philosophy have obviously drawn from social sciences and humanities. The rehabilitation sciences particularly physio-therapy have exercised an indelible influence on sport medicine and adapted physical activity. In sport management the influence of business management, law, communication and marketing is evident (Wuest and Bucher 2006, 14).

4.0 Limitations: Internet subjects growth trends

In the preceding sections we discussed so far the various trends and modes of growth of subjects. It is important to note that these modes of formation study were based upon the information resources that are physically in the library and those that are meant to be used in academics mostly. Hence this study can be seen as a study in a more controlled environment mostly drawing on Ranganathan's theory. The growth study becomes a real challenge when we consider the Internet subjects which are chaotic and uncontrolled. There is an information deluge and is not easy to quantify the volume of knowledge, the number of subjects or domains or speed of growth. Having stated this, we do accept there is need for growth study and identification of various modes of formation of Internet subjects. It becomes primarily important to ensure better organization and representation of information resources on the Web. Some of the examples of Internet subjects are: social networking, social organization, online gaming, email, virtual conferencing and communication, e-commerce, webisode, webometrics and so on. The incidence of interdisciplinary (and even multidisciplinary) subjects is greater as collaboration is facilitated by the Internet. Transdisciplinary mode is when a subject like ethnography emerges due to work in interdisciplinary domains converging at higher levels of generalization. Barabasi, et al. (2000) opined that in the era of multidisciplinary and interdisciplinary science despite some randomness, fundamental laws and organizing principles can explain topological feature of diverse system such as Internet.

5.0 Relevance and use

Binwal (1992, 197) aptly writes: "Modes of formation of subjects represent a typology of relations and act as guiding ideas in recognizing and formulating relations among concepts constituting a subject." Implications of such studies for hospitality in library classification have been explained and elaborated by Husain (1989). Beghtol (1998) has reported some attempts to revise major library classification systems to accommodate multidisciplinary works more appropriately to reorient classification research towards pluralistic needs of multidisciplinary knowledge. Importance of such studies to the LIS community in general cannot be gainsaid for its own sake. Knowledge is a librarian's stock in trade (Satija, 1992, 40). A good shepherd knows his sheep.

6.0 Summing up

Ranganathan and McGarry mostly discovered these modes by impliedly empirical studies based on the published literature. Ranganathan was more speculative and intuitive. It may be easily visualised from the emergence of recent academic subjects that these modes of growth are not exclusive or working singularly. There may be two modes at work simultaneously. Take the new subject of early

childhood studies where fission and agglomeration are together at work. Specialization with cooperation across the disciplines seems the present trend as exhibited by the recently completed Human Genome Project (HGP 2003). Recombination of specialties across disciplinary borders is viewed by Dogan (2001b, 14853). Obviously such results are never final. Subjects will continue to be fragmented, aligned and re-aligned in different ways. The more we understand the nature of knowledge more may be the modes that can be visualized. This 'so various, so beautiful, and ever new' universe of knowledge will continue to throw forth new subjects formed by yet unforeseen modes. The report of the Gulbenkian Commission (Wallerstein et al. 1997, 103) clearly mentions: "We are at a point when it [existing disciplinary structure] has been questioned and when competing studies are trying to come into existence." This is what was said long back by the invincible T. S. Eliot (1888-1965) in his poem East Coker II (1944):

The knowledge imposes a pattern, and falsifies,
For the pattern is new in every moment
And every moment is a new and shocking
Valuation of all we have been.

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