

CHAPTER 4

DISCIPLINE: MEANING, EVOLUTION AND CLASSIFICATION

3.1.0 Introduction

The accumulated data, information, knowledge, and wisdom of the human race are broken into a large number of disciplines. Usually a discipline represents a particular branch of knowledge. In the words of P. Bourdieu, 2004, “A discipline has an academic and socially acknowledged name (that for example can be found in a library classification system). A discipline is inscribed in, and upheld by, the national and international networks of research, university departments, research institutes and scientific journals that produces, certifies, rewards, and upholds that which he calls the discipline’s capital. And a discipline is characterized by a particular, unique academic and social style” (Quoted in T. Strand, 2007).¹ The disciplines themselves are broken into sub disciplines and sub sub disciplines. This is a convenient way to organize a library, a school program, or a higher education institution.

Higher education witnessed a significant evolution of its organizational structures throughout the twentieth and into the twenty-first century, and an expanding substructure of disciplinary foundations significantly influenced this process (Braxton & Hargens, 1996)². In particular, the growth of scientific and technical knowledge resulted in a proliferation of academic disciplines, which have continued to grow and subdivide. Before 1850, most colleges and universities taught only a few basic fields like classical languages, mathematics, and philosophy; by the end of the twentieth century some colleges and universities were offering students choices from as many as 149 fields of study (Braxton & Hargens, 1996). The largest and most visible effect of the growth and expansion of disciplines in higher education is the way colleges and universities are functionally organized (e.g., into colleges, schools, and departments). Disciplinary growth and variation also affect colleges and universities in their exercise of two of their key missions: instruction (Neumann, 2001)³ and research (Becher, 1994)⁴.

3.2.0 Discipline: Meaning and definitions

The concept of a discipline is not a straightforward one. The nature of disciplines is so different from each other that it is not easy to come up with a concise definition that would fit all of them to the same degree. The term 'discipline' may be used for many things at the same time and it is necessary to examine the various meanings of the word. Let us start with an exploration of the etymology of the word discipline.

3.2.1 Etymological meaning

The term 'discipline' originates from the Latin words *discipulus*, which means pupil, and *disciplina*, which means teaching.⁵ The term discipline is defined by the **Oxford English Dictionary** as "a branch of learning or knowledge". It defines a discipline both as a noun and as a verb as follows⁶:

As noun

- the practice of training people to obey rules or a code of behaviour, using punishment to correct disobedience: *a lack of proper parental and school discipline.*
- the controlled behaviour resulting from such training: *he was able to maintain discipline among his men.*
- activity that provides mental or physical training: *Kung Fu is a discipline open to old and young.*
- a system of rules of conduct: *he doesn't have to submit to normal disciplines.*
- a branch of knowledge, typically one studied in higher education: *Sociology is a fairly new discipline.*

As verb

- train (someone) to obey rules or a code of behaviour, using punishment to correct disobedience: *many parents have been afraid to discipline their children.*
- punish or rebuke formally for an offence: *a member of staff was to be disciplined by management.*

WordNet⁷ defines discipline comprehensively as follows:

As noun

- a branch of knowledge; "in what discipline is his doctorate?"; "teachers should be well trained in their subject"; "anthropology is the study of human beings";
- a system of rules of conduct or method of practice; "he quickly learned the discipline of prison routine"; "for such a plan to work requires discipline";
- the trait of being well behaved; "he insisted on discipline among the troops";
- training to improve strength or self-control;
- the act of punishing; "the offenders deserved the harsh discipline they received"

As verb

- develop (children's) behavior by instruction and practice; especially to teach self-control; "Parents must discipline their children";
- punish in order to gain control or enforce obedience; "The teacher disciplined the pupils rather frequently".

Definitions in different dictionaries give a whole range of quite different meanings of the term from training to submission to an authority to the control and self-control of behaviour. As a verb, it means training someone to follow a rigorous set of instructions, but also punishing and enforcing obedience. In this study, the term discipline has been used in academic sense to refer a particular area of knowledge or study, especially a subject studied at a college or university.

3.2.2 Definitions given by different scholars

Different scholars define the term 'discipline' differently. Some of the definitions of the term discussed below:

John Walton (1963)⁸ states, 'By discipline I mean a body of subject matter made up of concepts, facts, and theories, so ordered that it can be deliberately and systematically taught.' According to him, a discipline is a body of subject matter that is teachable. However, Walton's definition does not define a discipline comprehensively as it considers any body of knowledge as a discipline which has quality of teachability. However, there are many subjects which are taught at different levels but are not considered as disciplines.

Janice Beyer and Thomas Lodahl (1976)⁹ describes disciplinary fields as providing the structure of knowledge in which faculty members are trained and socialized; carry out tasks of teaching, research, and administration; and produce research and educational output. Disciplinary worlds are considered separate and distinct cultures that exert varying influence on scholarly behaviors as well as on the structure of higher education. Disciplinary communities establish incentives and forms of cooperation around a subject matter and its problems. Disciplines have conscious goals, which are often synonymous with the goals of the departments and schools that comprise an institutional operating unit.

According to M. S. Yadav and T.K.S Lakshmi (1995),¹⁰ discipline refers to a specific area of study- a branch of knowledge recognized by a certain distinctness it reveals in its substance and methodology. A discipline is a deliberate differentiation of the knowledge base with a specific perspective in order to gain better understanding of the phenomenon under focus. According to them, the knowledge base represents the sum total of the human understanding of environment. Disciplines are derived from the knowledge base but get formulated in recognizable differentiated forms of both substance and methodology due to further specialization, diversification and differentiation.

Bryan Turner (2001)¹¹ has pointed at the ecclesiastical meaning, which refers to the order maintained in the church, and at the medical meaning of ‘discipline’ as a medical regimen imposed by a doctor on a patient to the patient’s benefit. It follows that the academic discipline can be seen as a form of specific and rigorous scientific training that will turn out practitioners who have been ‘disciplined by their discipline’ for their own good. In addition, ‘discipline’ also means policing certain behaviours or ways of thinking. Individuals who have deviated from their ‘discipline’ can be brought back in line or excluded.

According to Dogan, 2001¹² "The term “discipline” refers both to organizational units in educational programs (for example, in schools) and to organizational units in knowledge production. The term ‘discipline’ is inherited from the vocabulary of nineteenth century and is understood as a branch of instruction for the transmission of knowledge and as a convenient mapping of academic administration”

The term ‘academic discipline’ certainly incorporates many elements of the meaning of ‘discipline’ discussed above. At the same time, it has also become a technical term for the organization of learning and the systematic production of new knowledge. Often disciplines are identified with taught subjects, but clearly not every subject taught at university can be called a discipline. In fact, there is a whole list of criteria and characteristics, which indicate whether a subject is indeed a distinct discipline. A general list of characteristics would include:

1. Disciplines have a particular object of research (e.g. plants, law, society, politics), though the object of research may be shared with another discipline.
2. Disciplines have a body of accumulated specialist knowledge referring to their object of research, which is specific to them and not generally shared with another discipline.
3. Disciplines have theories and concepts that can organize the accumulated specialist knowledge effectively.
4. Disciplines use specific terminologies or a specific technical language adjusted to their research object.
5. Disciplines have developed specific research methods according to their specific research requirements.
6. Disciplines must have some institutional manifestation in the form of subjects taught at universities or colleges, respective academic departments and professional associations connected to it.

Not all disciplines have all of the aforementioned six characteristics. For example, English literature has the problem that it lacks both a unifying theoretical paradigm or method and a definable stable object of research, but it still passes as an academic discipline (Terry Eagleton, 1983)¹³. Generally it is said that the more of these boxes a discipline can tick, the more likely it becomes that a certain field of academic enquiry is a recognized discipline capable of reproducing itself and building upon a growing body of own scholarship. If a discipline is called ‘studies’, then it usually indicates that it is of newer origin (post Second World War) and that it may fall short of one or more of the above mentioned characteristics. This would be typically lack of

theorization or lack of specific methodologies, which usually diminishes the status of a field of research. These ‘studies’ disciplines can either aim at remaining ‘undisciplined’, as women’s studies did in the 1970s, or they can engage in the process of their disciplinarization and institutionalization (Armin Krishnan, 2009).¹⁴

Furthermore, although there can be no true hierarchy in the world of science, as each discipline can claim expert knowledge in its own domain, not all disciplines are created equal. Some disciplines would be considered to be ‘more useful, more rigorous, more difficult, or more important than others’ (Douglas W. Vick, 2004).¹⁵ There are also tremendous differences between the disciplines with respect to their overall standing within universities, which can be seen by the number of students and the amount of research money they can attract and the overall resources that are allocated to them by universities in terms of teaching personnel, teaching hours, and equipment. Bigger departments with more staff and more expensive equipment tend to have greater influence within universities than smaller and less equipped departments. In the UK this means that vice chancellors are usually recruited from the science and technology disciplines on the grounds of greater managerial experience (Tony Becher, 1994).¹⁶ In addition, some newer disciplines like IT and management do quite well because of their great relevance to the business world and therefore greater attractiveness for students, while other more established disciplines like literature may have a hard time averting the fate of a slow death (Alvin Kernan, 1990).¹⁷

3.3.0 Discipline and other related terms

There are many terms appearing synonymous to the word discipline and used interchangeably with it. Meaning of these terms as defined by different sources is given below:

3.3.1 Subject

WordNet¹⁸ defines subject as synonymous to discipline. According to this online dictionary, ‘a subject is a branch of knowledge’. For e.g., "teachers should be well trained in their subject". Cambridge Dictionary¹⁹ gives the meaning of subject as an area of knowledge which is studied in school, college or university. However, there is

a minute difference between the two terms, generally a disciplines refers to any branch of knowledge with distinct subject matter and knowledge generation mechanism. While subject is an organized body of a particular branch of knowledge boundaries of which are specifically defined for organization of curriculum at different levels and institutions. The scope of the term ‘subject’ is narrow than the ‘discipline’. For e.g., discipline of geography can simply be defined as ‘the study of earth’. While when we talk about subject of geography taught at undergraduate or postgraduate level then it refers to the study of geography of world or geography of India or any other country. (B. K. Passi, 2012)²⁰

3.3.2 Department

An academic department is basically a division, or branch, of an academic institution; each department is devoted to a particular discipline. Departments differ from school to school but contain multiple academic disciplines. Departments can be anywhere from very broad to very specific or focused.²¹ Cambridge Online Dictionary defines a department as a part of an organization such as a school, business or government which deals with a particular area of study or work. For e.g. Geography Department, Zoology Department, Department of Health and Social Security.²²

3.3.3 Fields of Knowledge

According to P. H. Hirst,²³ unlike the forms of knowledge or disciplines the fields are not concerned with developing a particular structuring of experience. They are held together simply by their subject matter, drawing on all forms of knowledge that can contribute to them. Geography, as the study of man in relation to his environment, is an example of theoretical study of this kind, engineering an example of practical nature.

3.3.4 Faculty

oxforddictionaries.com²⁴ defines a faculty as:

- a group of university departments concerned with a major division of knowledge: *the Faculty of Arts, the law faculty.*

- *[in singular]* the teaching or research staff of a group of university departments, viewed as a body: *there were then no tenured women on the faculty.*

It is clear from the above explanation that none of the above-mentioned terms can be used interchangeably with the term ‘discipline’, due to marked difference in their meanings.

3.4.0 Evolution of disciplines

It is not a simple task to trace the evolutionary history of different disciplines. Specialization and compartmentalization of knowledge is as old as evolution of human beings itself. According to Yadav & Lakshmi (1995),²⁵ ‘The development of disciplines is a necessary aspect of social evolution. Disciplines evolve and differentiate continuously just as the human effort continues to understand the environment in an increasingly penetrating and comprehensive manner. The evolution of a discipline begins with knowledge which develops through social experience or interaction between human minds and the environment in the form of a personalized experience of a particular cultural milieu which might have typical connotations and gets translated into universally applicable terms. In objective conceptual form, cutting across all cultural and experiential barriers, and thus gets formulated as disciplines.’ The evolution of academic disciplines is also affected by the idea of specialization. Fundamental to the concept of academic discipline is the idea of narrowness of focus. A discipline defines boundaries, this is to be considered, and that is not. To go about the process of defining and focusing upon what is to be studied or considered, is to go about the process of specialization. In fact, it is this observable process of specialization that allows us to track the evolution of disciplines.

According to Stichweh (2001),²⁶ "The nineteenth century established real disciplinary communication systems. Since then the discipline has functioned as a unit of structure formation in the social system of science, in systems of higher education, as a subject domain for teaching and learning in schools, and finally as the designation of occupational and professional roles." If a linear progression toward today's academic disciplines can be found, it would begin with the specialized attention of scholars, focusing upon a fragment of human experience. A community of agreeable scholars

would then need to coalesce around some central premises regarding the experience, perhaps a uniquely defined practice of inquiry. Further development would depend upon specialized structures to support that community and its internal communication, such as universities, societies, or academic departments. The evolutionary history of disciplines can be explained by the following path:

Knowledge

(Sum total of human experience- culture, traditions, skills, concepts and principles etc.)



Specialization and Fragmentation of knowledge

(Due to man's curiosity and efforts to understand the environment more comprehensively and specifically)



Discipline

(Separate/ Specific area of knowledge/ Independent field of study having more focused approach)



Diversification and further specialization of knowledge within the discipline



Breaking of disciplinary boundaries and emergence of more specialized new disciplines by one of the following ways:

- ▶ Two or more branches of knowledge merge and develop own distinct characteristics and form a new discipline. For e.g. Bio-chemistry and Bio-physics.
- ▶ A social and professional activity becomes an area of application for several disciplines and recognized as an independent field of study. For e.g.

Education, Social Work, Management, Medical Sciences, Agriculture, Technology and Engineering etc.

- ▶ When a no. of discipline converge into an important field of activity and resulting in two way flow of ideas for the enrichment of both. It is an interdisciplinary approach in different disciplines.

3.4.1 Evolution of different forms of knowledge in pre literate societies

The history of evolution of academic disciplines is as old as the history of human evolution. Therefore, while tracing the evolution of disciplines one has to start with the structure and transfer of knowledge in ancient civilizations. The evolution and specialization of knowledge in the earlier phases of evolution of human beings have already been discussed in chapter-1. Due to continuous production of new knowledge in different fields the need of its preservation and transfer was also felt. The customs and knowledge of ancient civilizations also became more complex. Therefore, many skills would have been learned from an experienced person on the job in animal husbandry, agriculture, fishing, preparation and preservation of food, construction, stone work, metal work, boat building, the making of weapons and defenses, the military skills and many other occupations. These different kinds of skills and activities were the earlier forms of human knowledge. Each generation, since the beginning of human existence, has sought to pass on cultural and social values, traditions, morality, religion and skills to the next generation. In pre-literate societies, education was achieved orally and through observation and imitation. The young learned informally from their parents, extended family and grandparents. At later stages of their lives, they received instruction of a more structured and formal nature, imparted by people not necessarily related, in the context of initiation, religion or ritual.

3.4.2 Specialization of skills and traditions in to different forms of knowledge

While, the many activities and skills were accidently evolved initially, but with the passage of time, different skills and activities became more specialized due to

generation of new knowledge and new discoveries by the skilled and experienced persons in these fields. Each such discovery and invention enriched human's understanding in different fields of knowledge. The gaining of experiences in different fields and their further specialization results in the organization of knowledge of various fields. This organized body of knowledge of a particular field was termed as 'discipline'. As communities grew larger, there was more opportunity for some members to specialize in one skill or activity or another, becoming priests, artisans, traders, builders or labourers. The thirst for more specialization and new discoveries stimulated disciplined study in these different fields. For e.g. animal husbandry, agriculture, and fishing etc. gave birth to agricultural studies. Similarly, specialization in daily life's calculation and measurement was the inception of discipline of mathematics. In the same way, other activities like preparation and preservation of food, construction, stone work, metal work, boat building, the making of weapons and defenses, the military skills etc. gave birth to different disciplines. It is not easy to say that which discipline came earlier, as in their infancies different disciplines were the products of different daily life activities of human beings. However, disciplined study of different fields of human knowledge started with the start of institutionalized study and research of these areas at different times.

3.4.3 Emergence of Institutionalized study of different forms of knowledge as disciplines

Arthur L. Dirks, 1996 in his article '*Organization of Knowledge: The Emergence of Academic Specialty in America*'²⁷ gives a comprehensive account of the development of the academic disciplines as a controlling feature of American higher education. He states that the domination of American higher education by the present day structural and professional character is generally considered complete by the First World War, with the dominance of the university structure. That era is characterized tangibly by the new universities and graduate schools with their academic departments, the rise of discipline-based academic societies, growing academic publication in the disciplines, and increasing reward structures that define professional life in terms of disciplinary contribution. A brief description of his study is given below:

3.4.3.1 Classical Origins

While some instruction of a utilitarian and religious nature is understood to exist within a family or tribal community, some of the earliest formal efforts to institutionalize different forms of knowledge date from Pythagoras' Museum in the 500 BC. It cultivated studies of mathematics, music, acoustics, and geometry. Other inquiry was pursued by the Sophists, who established the oratorical tradition, but were itinerant teachers, and Socrates, who advanced his questioning method of provoking discovery.

In 392 BC, Isocrates established a rhetorical school in Athens to train students in politics. Primarily he taught clear thinking, persuasive speaking and writing, and how to deal with commonsense problems. His definition of an educated man is expressed in behavioral terms, propounding what we have generally come to understand and gentlemanly virtues.

In 387 BC, Plato opened his Academy in Athens. His standard studies included Pythagorean number theory, advanced geometry and speculations on science. He explored social issues, primarily: education, jurisprudence, politics, and sex. There was no organized curriculum.

Aristotle founded his Lyceum in 335 BC in Athens. It resembled the Academy, but was wider in intellectual scope. There was little that escaped discussion: music, botanical classification, biology, anthropology, ethics, law, logic, metaphysics, physics, politics, psychology, poetry, rhetoric. "In its instruction and research, it emphasized the principle that generalizations must be derived from the careful observation and classification of facts other than, as Plato held, from speculation and logic" (Cowley & Williams, 9).²⁸

It is unlikely there was much specialization, particularly in a real disciplinary sense. The realm of knowledge was drawn heavily from utility and commonsense, and there was no consideration of new knowledge. Instead, a general method of inquiry might be applied to any subject deemed worthy of discussion. For e.g., Socrates' query method, as described in Plato's works, could be applied to any topic. Other philosophers had distinct approaches as well, but fundamentally personal and

apparently usually limited in influence. The Greeks did also emphasize instruction in medicine. Further exploration in the specific history of medicine may yield a clearer picture of its development as a discrete subject of study.

Until 240 BC, Roman education was exclusively a concern for the male head of family. As Greek scholars were brought to Rome, more formal and advanced education developed. The focus was primarily on rhetoric, and teachers held low station until the first and second centuries AD, when support increased and structures were created for them in which to teach. Eventually grammarians, philosophers, and physicians came to be included among the teachers.

If there were a discipline in the Roman era to which a conscious community of scholars devoting their focus to a specific subject area, it would be the law. Originally, it was taught through apprenticeships, but after Cicero, schools began offering more than simply practical experience. Large legal consulting organizations began offering courses. It is unclear whether these studies were considered of the same order as grammar, rhetoric, philosophy, and the like, but may have compared favorably with the study of medicine. The study of law and medicine were clearly professional studies with specific career goals. One must consider whether professional studies constitute a discipline, per se, defined by the functional nature of the study, or whether they are aggregations of subjects or disciplines in service to applied learning for a profession. The age of Roman legal study peaked with Justinian, about 600 AD.

In Constantinople, Theodosius II founded a university in the 400s that lasted a millennium. Subjects ranged from grammar, letters, medicine, and law to philosophy. Theology was to be outside the curriculum. The school's purpose was mainly to prepare civil servants for the government. The university's fortunes waxed and waned, but in the 800s, it had regained its original character. Lay teachers taught philosophy, geometry, astronomy, and rhetoric, but no theology. In the 900s, there was support for literary education, geometry, philosophy, rhetoric, astronomy, grammar, arithmetic, music, law, and medicine. By 1453, the Turks had closed the school, and the scholars scattered across Europe, taking legal documents and classical literature with them.

Much of Renaissance learning about the classical era came from this dissemination of knowledge. (Cowley & Williams, 28-30)

Islamic higher education flourished from the 600s onward. By the golden era of Islamic culture in the 1000s, curricula covered a broad range. Included were mathematics (algebra, geometry, and trigonometry), science (chemistry, physics, and astronomy), medicine (anatomy, surgery, pharmacy, and specialized medicine), philosophy (logic, ethics, and metaphysics), literature (philology, grammar, poetry, and prosody), social sciences, history, geography, politics, law, sociology, psychology, jurisprudence, and theology (comparative religions, history of religions, study of the Koran, religious traditions, and other religious subjects). (Cowley & Williams, 31-34).

3.4.3.2 The Medieval Era

The earliest European universities were established in Salerno, Bologna, Paris, and Oxford in 1000s-1100s, and other cities, towns, states, and rulers followed suit. Salerno focused on medicine, Bologna on law. In Paris, the cathedral school became the supreme center for study of dialectics and theology. The teachers were all clerics attached to churches or monasteries. The curriculum of this late medieval era was entirely occupationally oriented. The purposes were specialized professional education. (Salerno: medicine; Bologna: law; Paris: theology and scholasticism). Where organization succeeded, particularly in the north or after 1300 in the south, the professional faculty might require completion of a lower course in the *septem artes liberales*, which included at that time grammar, rhetoric, logic, arithmetic, geometry, astronomy, and music. They were considered preliminary, however, and often were pushed down into preparatory schooling. They never interfered with the occupational purposes. There was no concern with new knowledge or research, just discovering truth through Aristotelian logic. All knowledge had to be conceptualized within the frame of Christian dogma. (Cowley & Williams, 45-49)

The seven liberal arts or the *septem artes liberales* first appeared in systematized form in the 400s. They probably were developed by the Greeks who were focusing on aspects of language and mathematics, although there was no normative program for

them and no single place to go to learn it all. In the middle ages the arts curriculum was thought to represent continuity through the Romans of the Greek *enkuklios paideia*, meaning "general education," to be obtained prior to professional studies. The subjects included three grouped under language: grammar, rhetoric, and logic (or dialectic); and four grouped under mathematics: arithmetic, geometry, music, and astronomy. At the suggestion of Boethius about 500 AD, the language group became the "*trivium*" and the mathematics group the "*quadrivium*." At first the *quadrivium* was taught before the *trivium* to provide content, but by 1300 they had been reversed (Kimball, 13-24, 47-51).²⁹

There apparently are faculties directly concerned with the professional studies as a form of specialty by this point. They are clearly becoming grouped by focus of study, and there is separation between those who teach the occupational courses, and those who teach the classical curriculum (*septem artes liberales*). While there may be subjects of focus here, it is interesting to note a lack of what we would call inquiry. In fact, the classical curriculum is nearly as utilitarian in purpose as the professional studies.

Bruce Kimball establishes some seven characteristics of the *septem artes liberales* curriculum as she follows it through the centuries. First, its goal is the training of a good citizen to lead society. Second, it prescribes values and standards for character and conduct. Third, it respects a commitment to those values and standards. Fourth, it relies upon a body of classical texts to provide the means to identify and agree upon what those values and standards should be. Fifth, it identifies as elite those who achieve greater merit by adopting the personal and civic virtues in the texts (among whom will be the teachers for they have the opportunity to truly study the texts). Sixth, it presupposes a certainty and ultimacy of learning, and there is no search for new knowledge. Seventh, these studies can be used to explicate divine texts (Kimball, 36-53).

By 1300, there were some 20 universities. A true university was expected to have at least one higher faculty of law, medicine, or theology above the faculty of arts, and the arts degree was required for entrance to the others. Influenced by Thomas Aquinas, logic and mathematics dominated (*quadrivium*), while moral training and

rhetoric diminished (*trivium*). Philosophy was elevated above all, and divided into natural, moral, and metaphysical division. A five-step program of education included the *trivium*, *quadrivium*, natural philosophy, moral philosophy, and metaphysics, in that order. Increasing emphasis on the graduate faculties reduced the importance of the classical arts education.

By 1300, some aspects of the model for modern American higher education were in place. There were lower and higher studies. The lower studies were general, and included studies that commonly characterize the arts and humanities today. These led to a degree in the arts. In addition, there were further studies leading to qualification for a profession. To some extent, the faculty and facilities of these educational efforts were separate.

3.4.3.3 The Renaissance and Reformation

In the late 1300s, a flowering of literary culture in northern Italy fostered the teaching of Petrarch, who began laying the foundations of Renaissance humanism. He "largely ignored the interests of the schoolmen in philosophy, logic, and professional studies, resurrecting instead the literary model of ancient Latin *rhetors* with Cicero as his main guide" (Kimball, 76). These new scholars united around an educational ideal based on the classical literature of antiquity, particularly that of Cicero and Quintilian. The grammatical *trivium* again assumed a place above the mathematical *quadrivium* for these scholars.

The Renaissance humanists took the name *studia humanitatis* or *studia humaniora*, emphasizing grammar, rhetoric, poetry, and history, often combined with moral philosophy. Their committed purpose was to the continual refinement of the human personality, "advancing classical study for its own sake rather than emphasizing its instrumentality for the study of theology, and they cited the necessity of leisure for the pursuit of classical study" (Kimball, 78).

Initially the "humanist studies" were taught in extracurricular and adjunct institutions. New residential colleges and schools next to universities offered some lecturing and tutoring based on the humanist educational ideal. But, generally it was slow to develop as part of the mainstream curriculum, making inroads at the Italian

universities by 1450, 1500 in Germany, and 1525 at Oxford. These studies existed along with the *arts* curriculum, and their acceptance was marked by appointments in ancient languages at Paris and Oxford in the 1530s.

The new curriculum actually suited Oxford and Cambridge well. They began with faculties of law, medicine, theology, and philosophy, typical of the medieval university. Gradually, however, the Inns of Court took over the law instruction, and hospital schools drew students of medicine, leaving theology and philosophy. The English institutions began attending to classical literature, as the humanists reached their full influence, no doubt benefitting somewhat from Erasmus' visit in 1510.

The university throughout Europe began to evolve in character during the early Renaissance. Changes occurred in the function of the institutions as changes occurred in the society around them and in the nature of their students. Medieval universities were professional schools, for medicine, law, and theology. In the feudal system, nobility and gentry were educated and trained in the palaces, but the feudal era and its culture began to fade. In its place, particularly in the north, were merchants and commercial entrepreneurs, who sent their sons to the universities for "polite learning." In addition, expanding demand for civil servants increased the value of education. During the 1500s and 1600s, the new gentry all but evicted the medieval theological students in England and France. It was the gentry who had the leisure to pursue the classical writers, and refinement of personality and character through arts and letters was quite appropriate for the new student.

Another significant innovation, actually initiating a period of de-professionalization of the academy, began occurring in the 1400s. The tutorial system began as a means of supplementing university lectures. By 1600, students were in residence in colleges at Oxford and Cambridge, where they were supervised and taught by tutors. The university had been reduced to registering students, examining them, and conferring degrees. Many endowed university chairs actually became sinecures. By the time of colonial American colleges, the tutorial system had completely replaced the professional teacher in the structure. Moreover, the emphasis on texts ultimately enabled the pedagogy of recitation that characterized American higher education for more than two centuries.

3.4.3.4. Formation of the American Curriculum

Kimball sees three different "liberal" studies in current use at the time of founding of the colonial colleges: 1) a residue of the scholastic classical program, with emphasis on logic; 2) *studia humanitatis*, generally in deteriorated form and compromised by scholasticism, including a reliance on classical languages and literature taught by dry grammatical and rhetorical rules; and 3) liberal-free subjects, primarily natural and experimental sciences and modern languages (Kimball, 123-124).

In their modeling of the English universities, the colonial American colleges transferred the humanist curriculum intact and maintained it through the early 1700s. It remained primarily a scholastic curriculum, with some strong humanist influences. This scholastic-humanist tradition was accommodated to Christian purposes. The humanists remained committed to the idea of man as defined by his function and place in the world and in society, a conception that began to come under pressure. Building interest in science and new directions in philosophy gradually expanded into a consciousness that has come to be known as the Enlightenment (Kimball, 115-118, 136)

Important to the idea of specialization and academic discipline, is the development of science as a field of inquiry. It entered the university very slowly, and slowest of all the institutions that served as models for American higher education, Oxford and Cambridge.

Generally, individual scientists worked in private and by 1600 had begun to form societies. The *Accademia Secretorium Naturae* met in Naples in secret in 1560 because members were considered to be in league with the devil, and it was forced to disband. The *Accademia di Lincio* in 1603 included Galileo. The *Accademie del Cimento* began in 1657 and lasted 10 years. In 1662, the Royal Society in England adopted the motto *Nullius in Verba*, "nothing by means of words." In France the *Academie des Sciences* began in 1666. The *Societas Regi Scientiarum* began in 1700 in Berlin, later combined with the University of Berlin to form the first great research university (Cowley & Williams, 55). Free journals began in 1682 (Kimball, 127). These institutions represent the beginnings of the "knowledge communities" that

nurture the modern academic disciplines. In America, the American Philosophical Society was formed in Philadelphia in 1769, and in 1780 the American Academy of Arts and Sciences in Boston.

The college curriculum in America embodied the scholastic-humanist tradition. At the time of the Revolution, apart from divinity, freshmen devoted nearly all their time to Greek and Latin grammar and arithmetic. Sophomores continued these subjects, added rhetoric, and advanced arithmetic or algebra. Juniors continued with the Latin, Greek, and rhetoric, completed algebra, geometry, and trigonometry, and studied a course in natural philosophy. Seniors reviewed all this, added metaphysics, more natural philosophy, and took a capstone course in moral philosophy from the president. It was all done in recitations and declamations, although some lecture format was creeping in (Kimball, 138-139).

In terms of curriculum, then, before the Civil War American higher education had not evolved much from its seventeenth century colonial origins. There were some limited attempts to modify the curriculum. After 1750, there were attempts to develop some courses in natural science, particularly astronomy, physics, and chemistry. There were also some technical courses in surveying and navigation. Mathematics was not taught until the revolution, but by 1828, it was firmly established and taught through calculus. Experimental science, however, was generally considered vulgar and utilitarian. Besides, everyone was convinced that all utilitarian knowledge was servile and beneath the dignity of men. Education was for mental discipline (Cowley & Williams, 100-109).

New structures were created to serve what colleges were unwilling to provide. Americans wanted to learn many applied and utilitarian subjects. There was a need in the growing country for such education. West Point opened in 1802, Rensselaer Polytechnic Institute in 1826, Normal schools in 1839 and Massachusetts Institute of Technology in 1852. (Cowley & Williams, 115)

There was little ground for the development of disciplinary specialization in the curriculum of American colleges before the Civil War. Barely modified from its European heritage, dominated by a single-curriculum concept, and frankly

discouraging either specialization or activities that might lead to it. It would require changes in institutional structure to open up the curriculum for disciplinary specialization and development.

In 1825, Harvard inaugurated the elective system, expanding to full elective choice by 1880. The elective system, with its corresponding concept of the major, in one moment created the seminal environment for the specialization needed for development of the modern academic disciplines. By allowing the student to make significant choices among courses, Harvard admitted it was not a seamless web of knowledge. The realm of human thought could reasonably be broken into pieces, and not every student needed all the pieces. In fact, the student could choose to spend a disproportionate amount of time in the study of a single piece or two, as could the faculty. The idea of elective choice took many forms at many institutions, but the wall of the classical curriculum had been irreparably breached. In the 1880s and 1890s, the elective system became widespread and institutions began to move away from the paternalism of moral cultivation that had dominated the educational philosophy to that point. (Veysey, 67)³⁰

John Hingham³¹ invokes Herbert Spencer to explain the phenomenon of specialization; Spencer stands out for his comforting faith in specialization as the universal law of progress. All structures, according to Spencer, are organic. All organisms evolve by a more and more complex differentiation of their parts. Specialization, therefore, is a beneficent necessity making greater articulation and interdependence. The unique enthusiasm for Spencer's philosophy in late-nineteenth-century America fits neatly with the American proclivity for specialization. (Hingham, 7)

The elective system was insufficient in and of itself to enable the kind of specialized communities needed for the focused work of the disciplines. That would take structural reforms, reforms that would create the structures to enable the communities to develop departments and graduate schools.

3.4.3.5. The Impact of the German Research University

In 1807, following Germany's humiliation at the hands of Napoleon, J. G. Fichte argued that only education could liberate the potential of the German people. At his urging, Germany reorganized the common schools, established compulsory education to the age of fourteen, and rebuilt its universities. Fichte proposed that scholarly research be emphasized in every field of thought, and that every university teacher should be primarily a research scholar. The University of Berlin made the existing Academy of Sciences an organic part of the institution, and established chairs in physics, chemistry, geology, and other sciences. Soon, all twenty German universities were the finest in the world. (Cowley & Williams, 134)

Yet the German experience obtained a uniquely American character as it was implemented. The Germans focused on non-utilitarian learning for its own sake, investigation and writing as opposed to teaching. German scholars tended to support idealism. Americans focused on utilitarian ideas in their research, and often missed the contemplative aspects of German research. They also liked the rigorous and precise examination of phenomena, but American higher education did not include sciences. Americans also liked the image of German professorial dignity, security, and intellectuality (Veysey, 126-130).

3.4.3.6. Structural Innovation and Specialization

Perhaps the first requirement for American colleges to move toward faculty specialization was some form of administrative differentiation about subject matter. As long as most subjects were taught by most tutors in a single administrative unit, there was little environmental support for focused attention upon a single subject. Therefore, institutional organization that recognized some differentiation among knowledge areas became important. Some early interest in concepts of a university also contributed to the developments.

The College of Pennsylvania was the first to develop a rudimentary department system, which it drew from the university at Aberdeen, Scotland. William Smith organized two schools or departments, a Latin and Greek School, and a Philosophy

School, which included natural philosophy. It also was the first to call its teachers a "faculty," and implemented faculty governance (Cowley & Williams, 82).

The most notable move toward structural specialization was the creation of departments at Harvard in 1825. George Ticknor in 1823 recommended the college be broken up into departments, classes be divided on the basis of proficiency, a limited elective system be permitted, and cease admitting non-matriculated students. These recommendations were enacted, but financial retrenchment and hostility of faculty diminished the achievement after a few years. Later, in 1831, a department was briefly created to teach the theory and practice of instruction, a school of education. (Storr, 19-28)³²

The University of Virginia opened in 1825 with parallel curricula in seven parallel departments called colleges. These curricula formed an early approach to elective choice. Students could study in all colleges but must complete the requirements of their own, for each gave its own degree. The colleges were a) ancient languages, b) modern languages, c) mathematics, d) natural philosophy, e) moral philosophy, f) chemistry, and g) medicine. Parallel curricula were being offered in Midwest colleges by the end of the Civil War. (Cowley & Williams, 117)

In 1831, New York University created two general departments. The first comprised faculty for higher branches of literature and science. The second included a complete course of English, literature, mathematics, and science. In 1835, a department was created for post-baccalaureate instruction in letters, fine arts, science, and the arts (Storr, 37-41). In 1847, a graduate department was created at Yale, and in 1860, the first American Ph.D. was authorized for studies in the Department of Philosophy and the Arts. (Storr, 55-57).

The dominant characteristic of the new American universities was their ability to shelter specialized departments of knowledge. (Veysey, 142) The proliferation of departments has been attributed by sociologists somewhat to the creation of new disciplines as splinters of old ones by faculty who find the old field saturated. An example of the development of specialization is the late nineteenth century split in philosophy between Hegelian idealism and devotion to scientific research

(psychology). English faculties split between partisans of culture and devotees of philological research. Sociology broke with economics. (Veysey, 59)

Cornell and Johns Hopkins departments became autonomous in 1880. Columbia by 1890, Harvard in 1891, Chicago in 1892. As faculty identity developed with the academic department, institutions began pushing resources to the department to enhance their prestige and reinforce their development. The department chair became important, and the department often became an end in itself, struggling for resources to support continual expansion (Veysey, 320-323).

3.4.3.7. The Changing Role of Faculty

Specialization and the creation of a knowledge community cannot occur until the members are involved in the enterprise. It is the faculty who become the practitioners of the discipline, Martin Finkelstein describes four stages in the development of this evolution: a) emergence in 1750 to 1800; b) expansion of the permanent senior faculty in 1800 to 1825; c) "gradual professionalization of academic faculties along disciplinary lines," 1825 to 1875, and d) formalization of career progression, 1850 to 1900.

In 1711, William and Mary established the first chair of mathematics and natural philosophy in America (Kimball, p.135). Other institutions followed suit. In 1720, as a result of a philanthropic bequest, two Hollis professorships were established, one in divinity, and one in mathematics and natural philosophy. In 1746, Yale appointed its first professor of divinity. These instructional staff was considered the first permanent faculty and their numbers increased until about 1800 when there were nearly as many professors as tutors. From the initial 10 in 1750, there had become 105 in 1795, while the number of colleges only doubled. (Finkelstein, 61).³³

By 1850, college teaching had become a mobile profession. The mobility of the profession means a significant level of specialization and disciplinary involvement had occurred by 1850. If one can move, one moves within the frame of the academic discipline, and the academic career begins to depend upon effectiveness in the discipline itself. (Finkelstein, 66-67) Old-time professor who was jack-of-all subjects rapidly disappeared from all but the smallest colleges by World War I. (Veysey, 142)

The outcome of this development of faculty professionalization is an individual highly motivated to research in a discipline and maintain it. There is considerable institutional structure to support it. Higham concludes that the professional research environment for American scholars is truly unique and beneficial. He points three factors: the standard entrance requirement of the Ph.D., the university department as a society of equals, multipurpose agencies to sponsor research, and rule by reference works, something Americans learned to do exceptionally well (Higham, 10-13).

This study has traced these six events contributed to the development of disciplines. First, the conceptual foundations of the arts curriculum itself. It provides the intellectual foundation and fundamental tools of inquiry to enable its own critical examination. Second, widespread commitment and ownership of those ideas, as occurred beginning in the medieval period. Third, stable institutional structures to teach it, as happened in the Renaissance. Fourth, a widespread commitment to developing new knowledge, which began in the Enlightenment and finally flowered in the late nineteenth century. Fifth, a professional body of scholars to begin the development, which came into being with professionalization of research faculty. Sixth, the institutional structures to provide the environment and incentives for developing the discipline. This occurred with the development of academic departments, journals, societies, and rewards. This study did not attempt to track any single discipline, though each has its own history.

On the basis of above study the land marks of the evolution of disciplines can be summarized as follows:

- ▶ In medieval world, there existed only four main faculties for study. They were Medicine, Theology, Liberal Arts and Canon Law. Contemporary curricular years and the number of studied disciplines increased greatly. From the middle of the nineteenth century, such rather new disciplines as non-classical languages, political science, literature, and economics were added.
- ▶ Besides, as there were made many discoveries in natural science and technology disciplines, engineering, biology, chemistry and physics were chosen to be studied.

- ▶ During the twentieth century when the development of the whole world was very rapid, new academic sciences were needed to be studied. New level of life and social conscience demanded that psychology, sociology and education disciplines were added into the normal curriculum year plan. In the end of the twentieth century, a new explosion of scientific interest was observed. There appeared rather new disciplines focusing on particular fields of knowledge or specific questions. Many disciplines were intended to prepare students for profession and career building.

- ▶ The development of Medicine led to new medical departments such as hospitality management and nursing. At last, the achievements in geophysics and biochemistry increased so much that there appeared the necessity to outline specific professions in this field because the scientist contribution to this branch was great and became widely known.

3.5.0 Classifications of Disciplines

Classifications are important to scholars because they help to bring order to a chaotic world. Typologies allow scholars to group things in a parsimonious number of categories that assist in grasping relationships and trends. Preliminary classifications of new sets of objects or phenomena can lead to the detection of previously undiscovered patterns and to the generation of theory to be tested. In both scientific and nonscientific fields, as in daily life, classification is a common activity. There is no one general classification of academic disciplines. Different researchers take different bases of their organizations. However, the majority of them have some identical features. Some of them are discussed below:

3.5.1 The Approximate Classification of Academic Disciplines ³⁴

In approximate classification of academic disciplines, disciplines are arranged into following subgroups:

1. Fine Arts which include such disciplines as Art, Music, Theater, Visual Arts, and Performing Arts. The task of Fine Arts is to evaluate the human activity from the aesthetic point of view.

2. Humanities which are History, Language, Literature, Philosophy, and Religion etc. This subgroup also has its own task which is to comprehend a human creature as a unique phenomenon.

3. Social Sciences are Anthropology, Archeology, Area Studies, Cultural and Ethnic Studies, Economics, Gender and Sexuality Studies, Geography, Political Science, Psychology, Sociology. The aim of this group of academic disciplines is to investigate social role of a human and the results of humans' activities. Social Sciences are divided into General and Concrete Sciences. General disciplines explore general human activity, and Concrete Sciences investigate humans' activities in a concrete situation.

4. Sciences include Chemistry, Astronomy, Botany, Biology, and physics etc. The task of this group is to explore the nature.

5. Mathematics covers such disciplines as Computer Sciences, Logic, Mathematics, and Statistics. The aim of this branch of knowledge is to explore and systemize abstract notions and relations between them.

3.5.2 Aristotle's Classification ³⁵

Aristotle divides the disciplines into three classes, each has different aim and each requires special kinds of subject matter and special competence:

Theoretical: The aim of the theoretical is to know or to understand. Theoretical disciplines, such as mathematics and the natural sciences require investigators who are able to reason logically, to deal with abstractions, to build comprehensive theories; and the objects of study must possess at least relative permanence and uniformity. Thus, it is that, say, physics deals not with singular facts (particular events) but with general facts (invariant associations).

Practical: The aim of practical is to do. In contrast to the theoretical discipline, the practical disciplines are concerned with subject matter capable of change or alternation. Such subject matters, for example, as human character and social institutions have the necessary characteristics. The chief practical disciplines for Aristotle were ethics, politics, and education. The practitioner obviously needs certain skills and abilities that differ from, or go beyond those needed by one undertaking theoretical investigations.

Productive: The aim of the productive is to make or create. The productive disciplines, such as engineering, fine arts, and applied arts, require material that is even more malleable and skills that are more specialized and distinctive.

Aristotle's classification is still relevant. Beyond a few traditional academic disciplines, the majority of disciplines in contemporary institutions of higher learning are applied, dynamic, and relatively young- such as management, information technology, interior design, or dental hygiene.

3.5.3 Other Classification Systems

Numerous analytical frameworks are evident in the literature for classifying academic disciplines for purposes of comparative study. Four of these frameworks have drawn much of the focus of empirical work in the study of discipline differences. These are codification, level of paradigm development, level of consensus, and the Biglan Model.³⁶ Each of these frameworks is reviewed in turn with relevant commentary on categorical variation determined through empirical study.

3.5.3.1 Codification

Codification refers to the condition whereby knowledge can be consolidated, or codified, into succinct and interdependent theoretical formulations. As a cognitive dimension, codification describes a field's body of knowledge as opposed to behavioral attributes of scholarly activity. Use of the codification framework in the study of discipline has essentially been displaced by the use of the high-low consensus concept, because consensus, or level of agreement among scholars, has been determined to be a function of codification.

3.5.3.2 Paradigm development

Paradigm development, as first developed by Thomas S. Kuhn,³⁷ refers to the extent to which a discipline possesses a clearly defined "academic law" or ordering of knowledge and associated social structures. "Mature" sciences, or those with well-developed paradigms such as physics, are thought to have clear and unambiguous ways of defining, ordering, and investigating knowledge. At the opposite end of the scale are fields such as education and sociology, which are described as preparadigmatic. These fields are characterized by a high level of disagreement as to what constitutes new knowledge, what are appropriate methods for inquiry, what criteria are applied to determine acceptable findings, what theories are proven, and the importance of problems to study.

3.5.3.3 Consensus

The core of the paradigm development concept is the degree of consensus about theory, methods, techniques, and problems. Consensus implies unity of mind on elements of social structure and the practice of science. The indicators of consensus in a field are absorption of the same technical literature, similar education and professional initiation, cohesiveness in the community that promotes relatively full communication and unanimous professional judgments on scientific matters, and a shared set of goals, including the training of successors. Researchers commonly attribute high levels of consensus to the physical sciences, low levels to the social sciences, and even lower levels to the humanities. It is important to note that the terms paradigm development and level of consensus used by various authors to describe the nature of a discipline are simply two ways of explaining the same phenomenon as they describe a common dimension of disciplinary fields- the extent of agreement on structure of inquiry and the knowledge it produces. For example, analyses of disciplinary structure utilizing the concept of level of consensus postulate that the disciplines are arranged along a continuum, with well-developed sciences like physics at the one end and social sciences like sociology at the other (Cole, 1983).³⁸ Analyses utilizing the concept of paradigmatic development also find a range of disciplines from low to high levels of paradigm development (Lodahl & Gordon, 1972).³⁹

3.5.3.5 The Biglan Model

Anthony Biglan derived his taxonomy of academic disciplines based on the responses of faculty from a large, public university and a private liberal arts college regarding their perceptions of the similarity of subject matter areas. His taxonomy identified three dimensions to academic disciplines: (1) the degree to which a paradigm exists (paradigmatic or pre-paradigmatic, alternatively referred to hard versus soft disciplines); (2) the extent to which the subject matter is practically applied (pure versus applied); and (3) involvement with living or organic matter (life versus nonlife systems). The natural and physical sciences are considered to possess more clearly delineated paradigms and are in the "hard" category. Those having less-developed paradigms and low consensus on knowledge bases and modes of inquiry (e.g., the social sciences and humanities) are considered "soft." Applied fields tend to be concerned with application of knowledge, such as law, education, and engineering. Pure fields are those that are viewed as less concerned with practical application, such as mathematics, history, and philosophy. Life systems include such fields as biology and agriculture, while languages and mathematics exemplify nonlife disciplines.

Biglan's (1973a⁴⁰, 1973b⁴¹) disciplinary clustering on three dimensions (pure/applied, hard/soft, life/non-life) results in eight classifications: hard/life/pure, hard/non-life/pure, soft/life/pure, soft/non-life/pure, hard/life/applied, hard/non-life/applied, soft/life/applied, and soft/non-life/applied. The groupings and their associated disciplines from the Biglan study are illustrated in this table:

Biglan's Clustering of Academic Disciplines in Three Dimensions⁴²

	<u>Hard</u>		<u>Soft</u>	
	<u>Nonlife</u>	<u>Life</u>	<u>Nonlife</u>	<u>Life</u>
<u>Pure</u>	Astronomy	Botany	English	Anthropology
	Chemistry	Entomology	German	Political Science
	Geology	Microbiology	History	Psychology
	Math	Physiology	Philosophy	Sociology
	Physics	Zoology	Russian	Communications
<u>Applied</u>	Engineering	Agronomy	Accounting	Educational Adm.
	Computer Science	Dairy Science	Finance	Secondary Education
	Mech. Engineering	Horticulture	Economics	Special Education
		Ag. Economics		Vo-tech Education

Note. From "Relationships between subject matter characteristics and the structure and output of university departments," by A. Biglan, 1973, Journal of Applied Psychology 57(3), 207.

Subsequent work by Biglan substantiated systematic differences in the behavioral patterns of faculty with respect to social connectedness; commitment to their teaching, research, and service roles; and publication output. Biglan concluded that the three dimensions he identified were related to the structure and output of academic departments. Specifically, hard or high-paradigm fields showed greater social connectedness on research activities. Also, faculty in these fields were committed more to research and less to teaching than faculty from soft or low-paradigm fields. Those in hard fields also produced more journal articles and fewer monographs as compared to their low-paradigm counterparts. Greater social connectedness was exhibited by scholars in high-paradigm fields, possibly because of their common

orientation to the work. Applied fields showed greater commitment to service activities, a higher rate of technical report publication, and greater reliance on colleague evaluation. Faculty in life system areas showed higher instance of group work with graduate students and a lesser commitment to teaching than their counterparts in nonlife systems areas. Empirical research applying the Biglan Model has been consistent in supporting its validity.

Other attempts at classification look more to the social and cultural components of disciplines (Becher 1989⁴³, Becher & Trowler 2001⁴⁴). This type of analytical framework sees disciplines in the higher education organizational structure as representative of a social construct rooted in distinctive disciplinary cultures. While recognizing the cognitive dimension of disciplinary variation, a socially based model, like that of Becher (1989), seeks to expand beyond paradigmatic consensus and into the influences of the cultural and social context on disciplinary identity. Within the social dimension, Becher (1989) pointed to the level of convergence as a distinguishing feature between disciplines. Convergence refers to the degree of cohesion and group identity displayed in a particular discipline. A field like mathematics, in which there are common modes of discourse and universal agreement on modes of proof and definition, would be a highly convergent field. Mechanical engineering, which lacks a central core theory or collective view of inquiry, is considered a divergent discipline. The social dimension of disciplines is also a factor affecting the choice of a rationalistic versus a holistic approach to research questions (Becher, 1981⁴⁵; Becher, 1989; Becher & Trowler, 2001). A rationalistic approach is one in which problems are addressed by breaking them into pieces, each to be studied separately, and a large number of researchers focus on a small number of problems; physics as a field epitomizes the rationalistic approach. On the other hand, a holistic approach sees reality as one and indivisible, every part must be seen in the context of the whole, and the ratio of researchers to problems is low. Collaboration and teamwork are more prevalent in holistic disciplines, and most of the social sciences fall into this group (Becher, 1989; Becher & Trowler, 2001). Crane & Small (1992)⁴⁶ distinguish between two kinds of disciplines: “restricted disciplines”, such as most physical sciences, which would be expected to exhibit a high degree of linkage between different research areas within the discipline, but less linkage to other

disciplines and “unrestricted sciences”, such as most social sciences, which would be likely to exhibit relatively diffuse links among research areas both within and outside the disciplines.

The meaning, evolution and characteristics of disciplines described above suggest that disciplines are not stable and static bodies. They are dynamic and continuously change with the knowledge exploration in the society. Due to social and academic demand, they enrich their content, modify their methodology and become differentiated into new branches in order to focus in a more penetrating manner to an area of problem. Sometimes their overlapping with each other leads to interdisciplinary study of a problem. In the next chapter different criteria to analyze a body of knowledge as a discipline will be discussed.

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