

FROM TELESCOPIC TOWARDS PANAROMIC VIEW OF KNOWLEDGE - FORMATION OF DISCIPLINES AND ORIGIN OF INTEGRATION AMONG DISCIPLINES

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Abstract

The paper presents brief history regarding the portioning of knowledge into disciplines. The Paper opens up the debate by highlighting the origins of Disciplines and Universities, then it goes on to discuss how scientific revolution and enlightenment influenced the disciplines, how disciplines were consolidated in the late 19th century, how the academic disciplines of the 20th century were produced, dawn of interdisciplinary, University reforms that resulted from the initiation of interdisciplinary praxis, what made interdisciplinary studies to become an academic field and Complexity and Transdisciplinarity.

Keywords: Discipline, Integration, Interdisciplinarity, Transdisciplinarity

Introduction

The considerations about fragmentation and specialization and the power for integration of abilities are old and have a protracted history which extends from old Greco-Roman times. The concise history of the inception of Interdisciplinarity suggests that they emerged in accordance with a sequence of educational and cultural challenges which required alternatives. Knowledge had been accumulated by the period of ancient Greeks to such an extent that instructions in poetry, gymnastics, literature, music, philosophy, and mathematics were offered in Plato's Academy which was founded in 387 BC. The reason for it was promotion of social, moral and physical development of the "whole person". This concept is foundational to the integrative values in liberal education, general education, modern humanities, and various programs of interdisciplinary studies (Hirst, 1974).

The great philosopher Aristotle, started the act of partitioning knowledge into subjects. A clear hierarchy of various academic subjects was established with theoretical subjects of mathematics, physics and theology at top, practical subjects like politics and ethics in middle and productive subjects like poetics, engineering and fine arts at bottom. This structuring of knowledge was found by Aristotle as necessary but regrettable as it disregarded the principal thought of unity of all knowledge. Philosophy was placed on top of his hierarchy as the universal field of inquiry for integrating these subjects, as an approach to unite all the diverse branches of learning (Moran, 2010). This classical division of knowledge significantly remained intact till the 19th century, when another scheme of disciplinarity emerged.

Origins of University and Disciplines

In the 12th century development was seen of new institution which was to assume a noteworthy part in the command of European civilization and the improvement of the disciplines: the university. An institute of higher learning; the modern university provides research and teaching and can award academic degrees.

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It developed from the cathedral schools in medieval era and laid on the conviction that there was a crucial and universal solidarity of knowledge and that through Christianity; faith was the most noteworthy dictate of knowledge (Apostel, 1972). In 1208 or 1209 in a letter of Pope Innocent III the initial recorded manifestation of “university” was found (M. Bishop, 1970). The initial universities were found in Paris, Oxford and Bologna where groups of masters/ teachers and students would meet, mostly in rented rooms or halls. It’s interesting that the meaning of university doesn’t mean universal or universe but it makes reference to the totality of a particular group, like a group of students (Haskins, 2002; Rashdall, 1936).

Till the 13th century and the very least till the end of 18th century, university students were inclined to study a fundamental subject of liberal arts which were divided into quadrivium (astronomy, geometry, music and arithmetic), which addressed things quantitatively and trivium (rhetoric, grammar, logic) which addressed things qualitatively (Moran, 2010). By help of this curriculum students were prepared for their professions. Like students these days chose a major, similar to those students specialized in medicine, law or theology. These subjects correspond to the modern courses in science and arts (M. Bishop, 1970).

The roman introduced the word disciplina; now known as discipline because they thought that education needed to relate to the specific political, ecclesiastical and economical ends (Klein, 1990). Medieval scholar interestingly ended up excluding contemporary cultural developments and even mechanical arts like navigation, agriculture, weaving, theater arts, war etc. It wasn’t until the twentieth century that these fields were included in the academic curriculum of Western universities. The disciplines and the university became a knowledge production engine which was far more effective than any other method of learning devised by previous civilizations.

Influence of Scientific Revolution and Enlightenment on Disciplines

During the late 17th and 18th centuries there was acceleration in the production of disciplinary specialization and knowledge. It was due to two movements. Firstly, the enlightenment movement; which was an intellectual movement all over Europe and focused on progression of human knowledge through reasoning and also provided justification for the modernism movement. The second movement known as the scientific revolution occurred approximately in the same period and focused on reductionism i.e. greater specialization and empiricism i.e. heightened research activity, first in sciences and later in all disciplines. The importance of these movements is that they posed a challenge to the concept of unity of knowledge. The initial division of natural and empirical sciences is recorded from this time.

However, the greater disciplinary specialization was not seen as a positive development by all. Giambattista Vico, an Italian thinker in the early 1700s proposed a new approach to learning. He argued that the dominance of mathematics and science in the studies resulted in neglecting the broader education because of biasness towards specialized knowledge. He claimed that the natural sciences were inferior to the human sciences such as law, philosophy and history because they only explain the external phenomenon in nature whereas the human sciences can gain understanding and knowledge from within (Moran, 2010). Still, Vico’s request for a more comprehensive approach and less specialization was ignored.

Consolidation of Disciplines in early 19th and late 18th centuries

Between the 1750s and 1800s, the disciplines strengthened their grasp on the production of knowledge and teaching by adopting three revolutionizing techniques; grading, examination and writing. The three new teaching settings introduced these practices including; the laboratory (began before the revolution in the French Grandes Écoles), the classroom (began in around 1760 in Scotland), and the seminar (began in around 1760 in German universities).

Disciplines also made it difficult for the scholars to cross the disciplinary lines by hiring of their own PhDs and publishing of disciplinary journals. Through a combination of these settings and practices, disciplines were able to strengthen their position and to speed up production of the new knowledge (Hoskin, 1993). Because of the success of these settings and practices, they're used globally.

Rise of contemporary disciplines and professionalization of knowledge in late 19th and early 20th centuries

Due to the developments in the late 19th and early 20th centuries, the modern concept of disciplinarity and the academic disciplines of today were produced (Klein, 1990; Lattuca, 2001). The formation of disciplines in the natural and physical sciences was witnessed in this period like chemistry, physics, biology, even though between the mid-17th and late 18th century the division process was going on. The social sciences fragmented into economics and anthropology in the mid-19th century followed by sociology, political sciences, history, and psychology. Even though humanities are the oldest subjects, they were the last to gain a modern disciplinary form (Easton, 1991).

Competition for the university resources increased with the rise of the scientific specialties. Hence universities started to arrange themselves all over the disciplines. The new professional societies in the US accompanied these disciplines. In history, national organizations emerged in 1884, political science in 1903, sociology in 1905 and economics in 1885 (Hershberg, 1988). The isolated specialists were kept informed by the disciplinary journals about the latest research and it also provided them with a forum to present their own studies. Specialists didn't have to consider aspects other than that of their own specialty (Swoboda, 1979).

According to Klein (1990) disciplinarity was reinforced by two main ways as the modern university developed. Firstly, specialists were demanded and received by industries. Secondly, students were recruited by the disciplines in their ranks. Trend for specialization particularly in the sciences, was propelled further by progressively more expensive instrumentation, highly trained personnel and elaborately equipped laboratories. Even though for the well-educated baccalaureate the 'Renaissance Man' remains an ideal, according to Hershberg (1988) it's not a good model for the new specialized, professional research scholar.

Due to the growth of academic disciplines, concerns were raised about the overspecialization, particularly of how these new disciplines were connected to the problems of selfinterest and power. Friedrich Nietzsche, the German philosopher in late 19th century and José Ortega y Gasset, the Spanish philosopher in early 20th century, viewed the new disciplines as indication of a more generic event: the increasing interdependence of business, education and government. This interdependence was driven by the economic system which depended increasingly on the accessibility of professional and specialists. Due to this, the universities and the disciplines were serving two main functions: they provided training to people in careers in business and

government and gave these contemporary professions status and legitimacy by awarding them academic credentials (Moran, 2010).

Advent of Interdisciplinarity and Interdisciplinary studies

It was natural that once there was establishment of disciplines, an interest began to be developed in Interdisciplinarity. In order to be successful, Interdisciplinarity had to appear attractive to the university administrators. It's also noteworthy that on the teaching side pressure for Interdisciplinarity came before it reached the research side. The notion of Interdisciplinarity on the teaching side and its emergence is due to the response to the two major developments in US in 20th century. The first one is related to the general education movement in the early 20th century. The second is related to the 1960s Cultural Revolution and it resulted in reforms in the higher education.

a) General education movement:

After the World War I the general education movement rose as a response to various problems plaguing American education and culture at that time, such as the crumbling cohesiveness of the general education and the absence of national unity (Boyer & Levine, 1981). The general education movement advocated that these issues could be solved through accentuating on arts and values which are related to classical humanism that focus on the wholeness of human nature and knowledge. These values and arts in four ways are general: (1) they are applied on all subject areas, (2) they are embracing all the basic skills, (3) they have an effect on the development of whole person, (4) guidance is provided for everyone.

In essence the notion of Interdisciplinarity can be inferred from the liberal humanism and general education movement. Two different notions of Interdisciplinarity at workplace are: pragmatic Interdisciplinarity and traditional Interdisciplinarity. The former focuses on the historically situated issues of society. The latter focuses on the secular and classical ideals of liberal education and culture. Both conceptions however agree that general education is the field in which all parts can add up to make a cohesive whole (Klein, 2005). The binding force of these diverse pieces is perceived to be a common basis of great ideas and books standing on the two millennia of development of western culture. Advocates believe that by requiring students to review this common basis of knowledge, a rise will occur in vocationalism, relativism, empiricism, materialism, departmentalization and specialism (Graff, 2008). Hence of the first motivations, unity of knowledge promoted interdisciplinary studies in US

b) Era of Cold War and Interdisciplinarity:

The second education reform movement started after World War II which was triggered by General Education in a Free Society (1945 Harvard report) (Kravitz, 1994). According to this report there was a need for a new general education curriculum which should be based on the writings and sciences of European humanist tradition. With communism and fascism at the background, proponents planned that the curriculum will provide a common basis of beliefs, values and knowledge focused ideals of democracy and freedom - simply put, a national ideology opposite to communism in the era of cold war (Bender & Schorske, 1998).

Around the same period, there was intensity in the criticism of disciplines and it accentuated on two themes. Foremost was the great power which disciplines had gained since the turn of the century. Michel Foucault, a French philosopher in 1960s influenced by Friedrich Nietzsche argued that the disciplines were not just a means for producing knowledge but they

were a sophisticated mechanism to regulate social relations and human conduct. He discovered the examination to be the classical practice which embodies both the modern practice of the meticulous disciplinary control and the modern power of knowledge (Hoskin, 1993).

The next criticism centered on the increasing isolation of disciplines from one other. By using anthropological metaphor of the tribes Tony Becher (1989) describes the disciplines as each having an individual language and culture. According to him men of the sociology tribe don't really consider the concept which physicists consider and have almost no idea about it. So if there was a building being utilized by the English department and it was visited by the sociologists they would probably encounter hostile or at least cold stares from them. Hence the domains exist as independent states each with different subcultures.

Moran (2010) reflecting Foucault complain that disciplines use their huge power by authorizing specific ways of operating and thinking while excluding others.

Advent of interdisciplinary studies and University reforms in 1960s:

This particular critique of disciplines gained strength by the assemblage of three main developments in US in 1960s: the student revolution, dramatic changes in the social routines and the Vietnam War. These three when combined served as a catalyst which prompted new thinking about the way academy should be related to the society (Mayville, 1978). Radical university reforms were called forth by this new thinking, one major element of this was the removal of traditional academic disciplines so as to give rise to holistic notions of training which are much closer to the pragmatic issues of life (Weingart, 2000). The scholarship and disciplines which they produced however wasn't able to explain or ended up ignoring the ideological struggles and great social movements which characterized that era. Included in these are: antiracist, civil rights, women's rights and anti-imperialist movements. The disciplines seemed obstructionist and irrelevant to that generation of young faculty and students for their quest of understanding, addressing and solving the greater problems of that age (Katz, 2001). Contrastingly, interdisciplinary studies ended up becoming a value-laden and programmatic term which stood for progress, innovation, reform, and opened up the university to various kinds of previously marginalized publics (Weingart, 2000). The 1960s radicalism developed new fields like women's studies, African American studies, ethnic studies, and new definitions of politics and culture.

However, when the mundane academic routines returned to universities due to subsiding of social struggles in 1970s, the consideration for Interdisciplinarity got less urgent. Hence according to Weingart (2000) what was considered progressive only a few years back was perceived to be outdated. However, young Interdisciplinarys like Julie Thompson Klein and William H. Newell under this calm surface, kept persistently asking questions about the legitimate aspects of inquiry, and through their work they slowly began to reconstruct the forms of knowledge and the methods of producing such knowledge (Katz, 2001).

Interdisciplinary studies developed into an academic field:

Newell in 1979 led a group of 50 Interdisciplinarys and decided that they required their own journal and professional organization and so founded the Association for Integrative Studies (AIS). The purpose of it was the study of interdisciplinary methodology, curricula, administration and theory. AIS in 1982 launched *Issues in Integrative Studies* a peer-reviewed

journal. AIS within a decade due to Newell's leadership grew to be a professional home in which many Interdisciplinarys worked together for development of potential in this field and it also became a national voice of the interdisciplinary studies.

The formation of AIS merged with the wider development reflects a basic change in the methods of production of knowledge. Peter Weingart (2000) observes that there is an increasing pluralism in the initiation, use of knowledge and production patterns, its disciplinary combinations and also in situations of knowledge production. This is an uneven development and doesn't affect all disciplines the same way. For instance, the disciplinary boundaries appear to be more fluid in natural sciences than in social sciences. The aim of knowledge production in universities is to understand. However, outside the university where there isn't much respect for the disciplines the aim is to generation of practical knowledge so as to solve the practical issues. Here the disciplines are even frowned upon and are seen as a hindrance to innovation or providers of skewed perspective.

Finally, due to the permeability of disciplinary boundaries and the growth of number of new specialties and fields day by day, Interdisciplinarity became a common experience. Not, however signaling the end of disciplines or its replacement by the Interdisciplinarity. It rather portrayed the need of Interdisciplinarity and limits of disciplines.

Transdisciplinary and the Shift to Complexity and Problem Solving

Interdisciplinarity can be defined in various ways but the most simple of all versions is collaboration between different disciplines that invites people to sit together and bring ideas, new concepts, theories and ways to work on things together. This can be done to discuss old issues, consider trending topics or even investigate into the future. The term though got a new dimension in 1970 in a meeting of the Organization for Economic Cooperation where it was argued that integration meant going beyond routine issues to look at things in a novel way. A reference was made to the term human sciences that take a lot of other factors into account than just the human make up. Over time however this concept has been altered, administered and shaped by the different school of thoughts that continue to join the bandwagon to try and define the terminology (Bernstein, 2015). Prominent among them are Marxism, feminism, phenomenology, approach sciences and microbiology.

Another happening of notice took place in 1982 when the OECD decided that interdisciplinary cooperation was no longer about what took place inside institutions like schools, colleges and universities. Rather the global environment had evolved to such levels that it was important to consider the outside environment. This new approach did not leave the endogenous work isolated; rather it was about taking the two extremes and trying to define the fine line that separated the two. The Swiss and Germans increasingly made use of this approach in the 1980s and 1990s accepting the fact that the requirement of the new world order was to take the task beyond scholarly literature and paradigms (Klein, 2001).

Conclusion

The paper briefly examines the very beginning when Interdisciplinary started to trend in the curriculum of Universities that were in Europe and America which followed generalist model. Yet in late 19th century this model was questioned by the blend of culture based and education based issues which in turn gave rise to discipline based system. After World War I and II the unconstructive impact of knowledge being divided consequently called up for restructuring of

the generalist model and thus revival of interdisciplinary studies were again trending. The 1960's socio-political disturbance guided the academia to make extensive attempts in order to introduce interdisciplinary studies into its culture thus moving ahead of the domains of generalist model that advocated a general education system. This was done by devising Interdisciplinary subjects and degree programs however these attempts were seen to be lessen on 80's and 90's. With the start of 21st century once again the growing significance of interdisciplinary studies were once again recognized. Scholars started to use the interdisciplinary studies in a way that it assisted them potentially and academically as well as it opened new horizons, dimensions and platforms of knowledge in order to address novel and existing problems.

Acknowledgement: I dedicate this work to the extraordinary vision of my mentor Dr Hasan Sohaib Murad, who initiated the idea of working on Consilience in the field of Organizational Science and deposited his confidence in my then novice self. I would also like to thank Dr Muhammad Umar Azeem whose guidance made to me enable to progress through my Phd journey.

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