Multidisciplinary Research Past, Present and Future

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***Abstract*- Multidisciplinary research is not a new concept it existed many years before. For example Aristotle wasa great Philosopher and his thoughts were based on logical reasoning also. Many disciplines have the scope of combining with other discipline to have multidisciplinary research. In order to conduct a multidisciplinary research a person should have very sound knowledge of two or more disciplines. This draw back we can overcome by combined research conducted by person's belonging to different disciplines. In order to achieve sustainable development we need such multidisciplinary research.**

Keywords*— *Mathematical Psychology, Mathematical Philosophy, Psychopathology, Physiologist, Pythagoreanism and Demographic Studies.

I. INTRODUCTION

Multidisciplinary research is not a new concept it existed many years before. For example [1] the writings of Aristotle cover many subjects including physics, biology, zoology, metaphysics, logic, ethics, aesthetics, poetry, theatre, music, rhetoric, linguistics, politics and government and constitute the first comprehensive system of Western philosophy. Another example is Sigmund Freud basically he practiced in nervous and brain disorders but became a famous figure in psychology. [2] In 1900, Freud published *The Interpretation of Dreams*, and introduced the wider public to the notion of the unconscious mind. In 1901, he published *The Psychopathology of Everyday Life*, in which he theorized that forgetfulness or slips of the tongue (now called "Freudian slips") were not accidental at all, but it was the "dynamic unconscious" revealing something meaningful. We can find many examples where interdisciplinary research was carried. Today also many of the universities are encouraging interdisciplinary research. The emergence of biotechnology, bio mimicry, biostatistics, Astrophysics etc., is results of multidiscipline. This type of research is needed for deeper understanding and development of nation as a whole.

II. RESEARCH IN PAST

Interdisciplinary research is not a new concept but today we speak a lot about it. Many of the researches in the past are based on multidisciplinary. In fact every discipline is interrelated and interdependent to each other. In some disciplines there exists hair line difference between.

A. Research Related to Literature

Many literatures are basically philosophical in nature. For example Shakespeare play "As you like it" in Act II, Scene 5 under the heading

"Under the green wood tree"
"Under the greenwood tree
Who loves to lie with me,
And turn his merry note
Unto the sweet bird's throat,
Come hither, come hither, come hither.
Here shall he see
No enemy
But winter and rough weather."

This poem is philosophical he calls the reader to come to the forest to enjoy the beauty and peace. We can give many examples of this kind.

B. Research Related to Psychology

Many of the researchers in Psychology are basically from biology or mathematics. For example [3] Ivan Pavlov was a Russian physiologist known primarily for his work in classical conditioning.Pavlov abandoned his religious career and decided to devote his life to science. In 1870 he enrolled in the physics and mathematics faculty at the University of Saint Petersburg to take the course in natural science. Ivan Pavlov devoted his life to the study of physiology and sciences, making several remarkable discoveries and ideas that were passed on from generation to generation. He won the Nobel Prize for Physiology or Medicine in 1904. He became one of the prominent figures in Psychology and can be called as father of classical conditioning.

C. Research Related to Population Studies

Concept of census was not known many centuries before but many places census data was collected basically for tax purpose and all members are not counted. During Ancient Greece ie.,[4]during Greek civilization belonging to a period of Greek history that lasted from the Archaic period of the 8th to 6th centuries BC to the end of antiquity. They had the concept of city-state, [5]Plato through the words of Socrates, asserts that societies have a tripartite class structure corresponding to the appetite/spirit/reason structure of the individual soul. The appetite/spirit/reason are analogous to the castes of society they are Productive (Workers), Protective (Warriors or Guardians), Governing (Rulers or Philosopher Kings). During census only those people stated above are counted but they didn't count slaves and women. Plato was a great Philosopher and contributed to Population Studies. Research Related to Population Studies

John Grunt is considered as father of Demographic Studies but he was basically a businessman.[6] Graunt started business in London in Birchin Lane. Around 1666 he was an opulent merchant of London with important offices in different companies, he was a.o. Captain of the London militia. He was also very interested in art. In 1662 Grauntpublished his famous Natural and Political Observations on the London Bills of Mortality, the first treatise on Statistics. To this, he drafted a theory and among others, the data involving higher birth rates of male children, child mortality, longer lifetime of women have been worked out with. They were well accepted, and in February 1662, 50

copies were presented to the Royal Society. Graunt also made the first observations about the sex ratio and thus the first attempt to apply the theory.

D. Research Related to Philosophy

Many of the philosophers are basically great mathematicians. For example[7] Pythagoras made influential contributions to philosophy and religion in the late 6th century BC. He is often revered as a great mathematician, mystic, and scientist and is best known for the Pythagorean theorem which bears his name. He was an Ionian Greek philosopher, mathematician, and founder of the religious movement called Pythagoreanism.

[8]Archimedes of Syracuse was an Ancient Greek mathematician, physicist, engineer, inventor, and astronomer. Although few details of his life are known, he is regarded as one of the leading scientists in classical antiquity. Generally considered the greatest mathematician of antiquity and one of the greatest of all time, Archimedes anticipated modern calculus and analysis by applying concepts of infinitesimals and the method of exhaustion to derive and rigorously prove a range of geometrical theorems, including the area of a circle, the surface area and volume of a sphere, and the area under a parabola. Other mathematical achievements include deriving an accurate approximation of pi, defining and investigating the spiral bearing his name, and creating a system using exponentiation for expressing very large numbers. He was also one of the first to apply mathematics to physical phenomena, founding hydrostatics and statics, including an explanation of the principle of the lever. He is credited with designing innovative machines, such as his screw pump, compound pulleys, and defensive war machines to protect his native Syracuse from invasion.

III. RESEARCH IN PRESENT

Today many field of study emerged as a result of interdisciplinary research. For example biochemistry is a combined discipline of biology and chemistry, biotechnology is a combined discipline of biology and technology, mathematical psychology is a combined discipline of mathematics and psychology, mathematical philosophy is a combined discipline of mathematics and philosophy, biostatistics is a combined discipline of biology and statistics etc., these fields combine two disciplines and a new multidiscipline emerged. Now we will try to understand some relatively new disciplines.

A. Mathematical Psychology

[9]Mathematical psychology is an approach to psychological research that is based on mathematical modelling of perceptual, cognitive and motor processes, and on the establishment of law-like rules that relate quantifiable stimulus characteristics with quantifiable behaviour. The mathematical approach is used with the goal of deriving hypotheses that are more exact and thus yield stricter empirical validations. Quantifiable behaviour is in practice often constituted by task performance.

As quantification of behaviour is fundamental in this endeavour, the theory of measurement is a central topic in mathematical psychology. Mathematical psychology is therefore closely related to psychometrics. However, where psychometrics is concerned with individual differences (or population structure) in mostly static variables, mathematical psychology focuses on process models of perceptual, cognitive and motor processes as inferred from the 'average individual'. Furthermore, where psychometrics investigates the stochastic dependence structure between variables as observed in the population, mathematical psychology almost exclusively focuses on the modelling of data obtained from experimental paradigms and is therefore even more closely related to experimental psychology/cognitive psychology/psychonomics. Like computational neuroscience and econometrics, mathematical psychology theory often uses statistical optimality as a guiding principle, assuming that the human brain has evolved to solve problems in an optimized way. Central themes from cognitive psychology; limited vs. unlimited processing capacity, serial vs. parallel processing, etc., and their implications, are central in rigorous analysis in mathematical psychology.

(Mathematical Psychology, 2014)[9] The first published study in this area was an experiment in 1898 by Norman Triplett on the phenomenon of social facilitation. During the 1930s, many Gestalt psychologists, most notably Kurt Lewin, fled to the United States from Nazi Germany. They were instrumental in developing the field as something separate from the behavioural and psychoanalytic schools that were dominant during that time, and social psychology has always maintained the legacy of their interests in perception and cognition. Attitudes and small group phenomena were the most commonly studied topics in this era.

B. Mathematical Philosophy

[10]The terms philosophy of mathematics and mathematical philosophy are frequently used as synonyms. The latter, however, may be used to refer to several other areas of study. One refers to a project of formalizing a philosophical subject matter, say, aesthetics, ethics, logic, metaphysics, or theology, in a purportedly more exact and rigorous form, as for example the labours of scholastic theologians, or the systematic aims of Leibniz and Spinoza. Another refers to the working philosophy of an individual practitioner or a like-minded community of practicing mathematicians. Additionally, some understand the term "mathematical philosophy" to be an allusion to the approach to the foundations of mathematics taken by Bertrand Russell in his books The Principles of Mathematics and Introduction to Mathematical Philosophy.

IV. RESEARCH IN FUTURE

Future research can be done in Sanskrit and physics, Sanskrit and science, Sanskrit and mathematics, astronomy and astrology etc., this will open a new horizon. Now we will try to understand these fields in short. In Sanskrit, nature is called 'prakriti', which literally means 'acting forth'. This description most certainly includes activities of mind that express a living meaning, from underlying consciousness. Similarly, in ancient Greek, nature is called 'phusis', which implies a growth of life with an expression forth of meaningful activity. In the Mandukya Upanishad, the three levels are described as manifested in three states - of waking, dream and deep sleep. And the ground is called 'caturtha' or

'turiya' or the 'fourth'. This description is designed for philosophical and spiritual enquiry.

V. CONCLUSION

Interdisciplinary research is a beautiful concept but person who want to conduct such research should have sound knowledge of both the disciplines. Although it appears that it is difficult to find such person, if it is well planned then we can achieve the goal. Two or more persons from different disciplines can join together and undertake a research in interdisciplinary. (Centre)[11] Some universities like University of Delhi and Jamia Millia Islamia jointly introduced a Two Year degree programme i.e. "Master of Mathematics Education" which is equivalent to M. Sc. in Mathematics Education under Meta University Concept from the academic session 2012-13. Persons from two or more disciplines can join and conduct a multidisciplinary research even though they are physically apart by they can be connected virtually. Therefore today we have great opportunity to do interdisciplinary research and we can go ahead with it.

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