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Convergence is the key to Innovation and Creativity in Science and Technology- Enhanced by Research Orientation

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Abstract

Many inventors in the past history have observed the combination of elements and stated in several writings. This fact can not be merely accepted without scientific empirical testing. This paper attempts to find some means to test this reality of convergence at various stages of the invention process. The methods used are convenient sampling and descriptive analysis of the stages of process involved in Creativity and Invention. The finding shows that there exists the phenomenon of Convergence and a way to calculate the merge. Higher the percentage of convergence in all stages greater the newness of the outcome. This paper proposes such study can be conducted in various fields as required. This can enhance scientific temper among Science graduates. Creative and Innovative activities can flourish even at the school stage.

Keywords: Convergence, invention, elements, creativity, science.

Introduction

In the present globalized market driven world, Human progress and development is highly influenced by the power of Knowledge and information. The technologically driven world spins around the information explosion and knowledge resources. In-spite of such global and multi-national transformation all over the world, many developed and developing countries face the down fall of economy due to its improper orientation. To-day the advancement of technology is at the door step of educational embodiments. The human and other resources are abundant in the global world and therefore the research and development depends heavily on the utilization of them in the right direction. One must understand the basic phenomenon of the universe as convergent reality. The Truth is the ultimate reality which is the union of all disciplines. Every inquiry and research is the search for understanding this reality. Leonardo da vinci whose expertise are revealed in number of significant subject area notes that "Everything comes from everything and everything is made of everything and everything returns to everything. Everything is interrelated and it is our job to find the connections[1]". To- day the academicians narrow view and our system of learning has brought to think in terms of competition and value. As a result medical field and engineering are higher and arts related fields are lower and such a mentality is prevalent among younger generation[2]. The business world has created the division in the scientific world. The scholars and youths of to-day are superficially seeing the reality that lacks depth knowledge. It is due to the attraction created by the visual reality and entertainment oriented environment. All though the leading countries in the world have realized the importance of knowledge creation which will lead to new innovation. In order to raise the scientific temper among younger people we have to look into the basics of creativity and invention.

This paper highlights the idea of convergence as the central axis for every science and truth. The universe is viewed as the totality of everything as one phenomenon that is truth and every scientific inquiry is arriving at truth that is nothing but a reality of Convergence. "The process of understanding fully the new idea is thrilling. Many inventors stew on a problem for days, weeks or years before the idea comes to them in the middle of the night. This is the moment when the true inventor will decide that the new idea is a breakthrough and will do whatever it takes to get the idea working[3]."

Historical Perspective: The innovative and creative process must be studied in depth. The origin of creativity begins in 1926 based on art and thought and Graham Halls proposes five stages such as preparation, incubation, intimation, illumination and verification that create new insights[4]. The fact that the right solution to any problem involves the variant thinking of the mind. Many scholars too affirm that creativity arrives as the result of intermixing of many reference points. Some scholars are having the opinion that exploring in depth and sprouting of new insights are part of any creativity. Psychologists have proposed one such technique is mind mapping. The process of creativity is nothing but the exercise of combining related elements into a new complex[5]. To-days scientific advances are due to such kind of activities by some individuals.

Recent global study on the leadership trait of 1600 CEO's found that success was based on creativity. Even the knowledge management specialists like Nonaka feels that explicit and tacit knowledge needs high creative process. Ultimately we can bring down to a single element as Blaise Pascal refers to innovation as a pattern of development based on the identification of antecedent

and consequent. The history has proved that creativity and innovation is tracing the interrelatedness[6].

Objectives: The objective of this study is to test the proposition that every invention or discovery over the history is the result of creative process which revolves around convergence. The invention process begins with identifying the basic elements which itself exists as sub elements. There exists convergence in the whole process leading to a new result or product. Tracing some of the inventions of the past can give us some clue to positive result. Can this be tested quantitatively is an attempt in this direction.

Methodology

This paper has developed a simple method to identify the convergence in the basic elements and process using convenient sampling. It has selected a few past inventions under scrutiny. It aims at how to enhance the scientific temper among students through such investigation. It uses descriptive method to identify the basic elements as well as the process of invention. It also uses an analytical method to trace the element of convergence which is the basis of research and invention of the past and forever. The advancement of technology in the twenty-first century is seen as the result of such convergence. The media elements are presented as a great tool in support of all these activities. A formula is created to measure the convergence in various stages. Thus the study is to present some case studies of past inventions to prove the underlying principles of creativity and invention type of activities. To do this first the percentage of each elements composition must be calculated.

Descriptive Cases: This paper has selected the invention of telephone as the first case in which the basic elements such as voice, air transmission to long distance and electrical pulse are evident. The process of linking them through the devices like transducers. After a long trail and sustained effort the inventor created some devices as telephone. The identification of the magnetic force through induction was an opportunity to develop a new device.

The second case selected for analyzing is the invention of the medicine penicillin as an effective drug to prevent the destruction of cells of the body attacked by some elements in the wounds. By observing the various elements as bacteria and ant bacteria. A solution was found that a specific element coming into contact led to prevent deterioration of infection of the wounds and found a cure[7].Similarly the environmental changes is observed and analyzed as the result of combination of number of elements. The change in nature is observed and how a new field of study has emerged as a result of the growth based on these principles[8]. A software creation is also studied as a case. The various elements are combined to develop a new software that can assist in doing the various jobs that humans can spent huge amount of time in completing these tasks. In the first stage of developing software, the requirements are specified as a problem statement and functional requirements are inserted to combine them all to new software. Lastly a Common visual design is taken as a case for this study. The design is created out of various processes involving number of independent elements. The process in design creation is investigated to observe the key element that is present. In all these cases, convergent appears to be the key element running through the whole process; It is presented more explicitly in the Tabular form as follows.

The convergence is more apparent in the process and final stages and the outcome is invention of a new product. This can be measured in some ways. This paper show a way to measure which may be of great help in applying the same method in various process i as alternative ways. As a sample this study takes the case number three for calculating the convergence. This formula is applied for every element that is present in the process of invention and can arrive at the total convergence by adding up them together.

Table 1
Case analysis of selected invention and creative works

Number of cases	Initial stage (Elements combined)	Process Stage (Mingling /merging process)	Result as a Product (New invention)
1	Vocal, Air, Hearing, Distance, Vibration Electromagnetic pulse, wire	Mixing all elements in various proportion in the process	Wired telephone
2	Micro organism know as bacteria , Growing the antibacterial, fungus, enzyme and juice	Process of contamination due to fungus, isolation of mould juice	Penicillin
3	Nature, Human, waste materials, health, food etc	Climate integration of human with nature intake of food and water produce waste materials	Environmental science
4	Texts, Problem stated, binary ,authoring language, Flow chart	Coding process Mathematical and logical process integrated with functional elements	A New software
5	Text, Visuals, Space, Color, Boxes Shape, lines, dots	Merging design elements in varying degrees based on some principles and creative mind	A Completed Visual design

Formula Applied

Convergence of Nature Air + Water + Waste material $E = \%n1 + \%n2 + \%n3../N$ 12% of air 26% of Water 64% of waste material $E = 12 + 26 + 64 = \frac{100}{3}$ $E = 33.3$	During the process of merge every element will loose certain percentage of its ingredients that is depreciation calculated by identifying the most essential to least essential element. Most essential is less % and least essential is more % $L = \%of\ lassn1 \times E/100$ 60% loss for the element air 30% loss for the element water 10% loss for the element waste material Air a = 60X33.3/100 =19.9 Water b = 30X33.3/100 =09.9 Waste c = 10X33.3/100 =03.2	Convergence index is calculated for every element $E - L\ for\ air + E - L\ for\ water + E - Lfor\ waste\ materia/N$ Active elements in merge Air E-a 33.3 -19.9 =18.4 Water E-b 33.3-09.9 =23.4 Waste E-c 33.3-03.2 =30.1 Total Convergence of the element nature: Nature = 18,4+23.4+30.1/3 N = 71.9 Convergence = 71.9/3 =23.9

Conclusion

The above analysis reveals that the convergence is present in every type of creative activities and one must spend time in locating the convergence. Any new entity is a combination of existing and known elements put together. This concept of convergence is reiterated by some scholars in the field of psychology like Howard Gardner speaking on human intelligence that a paradigm shift is necessary. To-day many domains are interplaying in the learning process of human which leads to multiple intelligence. This reality of broader thinking is one such supporting view for the idea that convergence is the key to intelligence leading to invention. This proves that we must provide space for the development of all domains into unison.

The above analysis shows that there are many elements present even in the initial stage. There exists already the element of invisible unity. Unity and diversity is part of every phenomenon that the early inventors have repeatedly stressed. It reveals that any creative and invention process must begin with identification of single element as part of others tied together. This descriptive analysis brings about the underlying principles that we can meet any unknown elements in the process that can help for creative process. In all cases the key element is convergence that is prevalent in initial, subsequent process stages leading to the end product. It reveals that there is no specific and definite ways for approaching this reality. Variant types of qualitative and quantitative measures can be used to show the convergence as well as calculate the amount of convergence present. It is shown in the case of selecting a few elements in nature and measured the convergence with in a limited frame of reference. This is a very exhaustive work to implement meticulously. Every knowledge creating activity can be brought under similar study so that innovation can be boosted. Research orientation is approached in a different angle and it is necessary for the beginners. This finding also enhances knowledge providers to encourage for research and invention in this perspective. New type of convergence based model can be developed to initiate creative and invention oriented activities in various fields. The convergence index for nature 23.9 having only three elements supporting deprecation loss to a limited reference. The actual index found by adding all elements will be of great help for research activities. Even this can be applied to the conferences held. Lots of knowledge sharing takes place but there must be some type of convergence taking place but goes unnoticed. A method should be created to indentify the

converging elements and so that it can enhance invention activities. There is a vast resource of knowledge is available by using convergence method can create and invent new technologies.

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