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Exploiting the concept of paradigms to generate ideas

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Abstract: This paper presents a method of generating ideas whereby a paradigm is systematically organized and mapped in one's mind after comprehensive analysis. It uncovers the basis and framework of the method based on the current understanding of the mechanics of creativity. The method consists of (1) analysis of paradigms, (2) systematic organization of ideas, (3) mapping of the ideas in one's mind, and (4) processing mapped ideas to form new ideas. The concept of paradigm has not been used as a basis of any creativity technique, except in the context of "paradigms of creativity." The influence of Kuhn's essay on scientific revolution and his use of the term, "paradigm shift", may be the reason. The scope of the presentation in this paper is limited to the author's profession of chemical engineering and related areas of study. Thus, the discussion does not revolve around current R&D in innovation management.

Keywords: Idea generation; creativity method; innovation technique; probing paradigms; paradigm shift; paradigm of creativity; model; framework; concepts

1 Introduction

Enhancing creativity is a popular endeavour and possibilities that merit exploration exists (Nickerson, 1999). This paper aims to establish a method of generating ideas that uses the concept of paradigms. About 200 creativity improvement methods have been recorded (mycoted.com, 2012). None of the said techniques directly deals with paradigms. Thus, this paper also tries to answer why paradigms are not applied in creativity methods except in the context of "paradigms of creativity". The author developed this paper based on the field of chemical engineering and related areas. Thus, his awareness on the current development in the field of innovation management is limited. Techniques developed in a field of study can be accessible to other fields for appropriate utilization.

2 Background of the study

The author worked on the study for almost 25 years but he has been interested in creativity his entire career. In 1988, he read a report, which described the paradigm of chemical engineering (Commission, 1988). At about the same time, he attended a

seminar by Stephen Covey, where paradigms shifts were used as examples. The said events stimulated the author's interest on paradigms. He analyzed the paradigm of his profession and other areas of interest. He called the activity "probing paradigms", which he used to formulate teaching strategies, develop innovations, and perform research works. From 2004 to 2010, he was able to find the conceptual basis of the technique.

3 Concept of paradigms

What is a paradigm?

The term paradigm comes from the Greek word, "paradeigma". Based on the Oxford dictionary, the word has various meanings, such as a model, a theory, a map, a perception, an assumption, a frame of reference, etc. with the context that often has to be explained (Simpson and Weiner, 1989). The term sometimes becomes a source of confusion and controversy if the usage is improperly conveyed.

Thomas Kuhn and paradigms (Kuhn, 1970)

Before the publication of Kuhn's book, the term paradigm was used only in connection with grammar and as a metaphor. Kuhn used the term liberally. Masterman (1970) identified 21 definitions that were used in the book. The book became famous and "paradigm shift" became a popular phrase. Kuhn's definition of paradigms as "universally recognized scientific achievements that for a time provide model problems and solutions to a community of practitioners" is adapted in this paper.

Manfred Stansfield and paradigms

Stansfield (2001) spent his childhood in four different countries and encountered problems associated with culture and practices. He became interested in paradigms because he realized that the realities that had been taught in school were not realities. His experiences moved him to write the book "Introduction to Paradigms". He defined paradigms as "a model of a portion of reality, with fewer dimensions and a manageable size, mass and energy". This definition extends the limited definition provided by Kuhn.

Determining Paradigms

The initial work on generating ideas was based on the author's discipline of chemical engineering. Each profession has its own paradigm—a set of knowledge that defines or guides a profession. The logical way to determine the paradigm of a profession is to trace and examine its history. We have to critically note the developments, new ideas, themes, thesis, arguments, paradigm shifts, etc. that may lead to points of views not seen before. The practices of the members of an organization as well as the proceedings of conferences provide us valuable insights. Parallel to the practice of the profession is the development of the curriculum. These two aspects interact with one another and usually settle down to adapting the same paradigm. However, academic activities are not in consonance with practices in industry sometimes. The major reason is that the objectives

or goals are different. Obtaining feedback from each other usually occurs. Textbooks, reference books, trade books, equipment catalogues, newsletters, and the patent literature, among others, all reflect data for paradigm determination. Stories, anecdotes, speeches, memoirs, biographies, recollections, etc., are good sources, too. Current events and the prevailing conditions of the world certainly affect the paradigm of a profession (Jose, 2000).

The paradigms of subjects other than professions can be determined by using other relevant parameters.

4 Probing Paradigms

To probe a paradigm, one should analyze, investigate and systematically organize all the ideas. This means a total understanding of every aspect of the paradigm. Some equivalent terms are finding insights, viewing perspectives, observing points of views, evaluating outlook, determining stand, examining position, and exploring attitudes. The synonyms of the word probe such as contemplate, muse, ponder, brood, mull over, cogitate, ruminate, study, examine thoroughly, go deep into, and feel around, among others, can be found in a thesaurus, which certainly add more complexity to the term. Since paradigms are patterns or models, we can consider paradigms as maps of knowledge. After evaluation, many new thoughts and ideas, which have been missed before, come out of the mind. It could be because those ideas were covered up by more prominent ones in the mind. The combination of two or more ideas may reveal another point of view. The probing of one's profession usually takes from six months to two years. Slowly, one develops the ability to produce many ideas that are useful for formulating strategies and developing innovations. Probing the paradigm of other subjects or topics then becomes automatic (Jose, 2000).

5 Establishing the conceptual framework of the method

The activity of probing paradigms was started informally. In the first ten years (1988-1998), the author noticed that a significant number of ideas came out of his mind, which he applied in his work. To disseminate the technique, he needed a suitable conceptual basis, on which he worked on from 2005 to 2011. He read several papers and books on creativity and innovation.

First influence

Plsek's (1997) field of expertise was on quality assurance, in which he applied creativity and innovation. He established the technique of "directed creativity". He discussed the mechanics of the mind and how the reality of the world around us is received by our senses, processed in the mind, and then used for thinking and judgment. He points out that the information we get is stored as components in different areas of the brain.

Mechanism of the mind

De Bono (1969), likened the flow of thoughts in the mind as streams of water that are disconnected. Connecting two streams or carving new streams represents a new idea. This metaphor becomes the initial basis of new idea generation in this paper.

The connectionist model and spreading activation theory

Cognitive psychologists employ the connectionist model theory. Mental episodes can be represented by simple interconnected networks of units, which can vary, depending on the model. The neurons are the units and the synapses are the connections in neural networks. Cognitive scientists use the spreading activation theory. According to this theory, the activation of a unit spreads to all the other units connected to it. It is always a feature of neural network models. As far as idea generation is concerned, the idea that is spread can still be connected to other ideas (Sun, 2008).

Knowledge maps, mind maps, concept maps

Henry Small (2003) mapped scientific paradigms physically based on citations of different authors and researchers on new ideas on particular branches of science, but the process is slow. Bollen, et al. (2009), collected onclick stream data of scholarly journals that essentially map scientists' online behavior. The online usage data was normalized and converted into a map that gave the relationships among different fields of knowledge. This is essentially a map of knowledge.

A mind map is a diagram used to symbolize ideas or other items linked together around a central idea or key word. It can be used to generate and visualize ideas and to study and organize information. It focuses only on a single word or idea. Concept maps are similar except that they connect multiple ideas or words.

In probing paradigms, the ideas are directly mapped in the mind.

The human brain as a neural network

The brain is considered a neural network computer. The ideas in probing paradigms are the inputs and once processed, different ideas are the outputs. Stephen Thaler (1997) built a neural network computer capable of human level discovery and invention. It invented products and process. The performance of the machine is based on his discovery that a neural network invents (or hallucinates) when some of the neurons are purposely destroyed.

Integrating the information

The items above are the information that supports the conceptual basis of the technique. When we probe paradigms, all the data and information are systematically organized and mapped directly to our brain. After some period of time (about six months to two years), we voluntarily or involuntarily connect two ideas in our mind to come out with new ideas. This can be done either while awake or asleep. Noting that the mind is a powerful neural network computer, we can expect it to produce many ideas. The technique is

useful for formulating strategies and new methods. After a while, ideas for invention and innovation naturally come out. The technique is only for generating ideas. Other methods may be needed to develop the ideas.

6 Description of the technique

The method consists of the following: (1) analysis of paradigms, (2) systematic organization of ideas, (3) mapping of these ideas in one's mind, and (4) connecting ideas to form new ideas.

The ideas are basically stored in different parts of the brain. Connecting two ideas will result in a new idea that could become an innovation. The connection of ideas can be done both actively (while awake or in the beta state) or passively (while asleep or in the alpha state). While awake we can use mind maps or concepts maps to organize the ideas or use the computer and consciously organize them in the mind. Passively, we lead our mind into the alpha state with recorded information fed using earphones. We can also explain the process by considering that our brain is a neural network computer consisting of two layers (conscious and subconscious mind). By inputting the information the neural network computer learns and processes the information and produces outputs in terms of new ideas. The new ideas can be inputted again for evaluation and for choosing the good ones (Jose, 2011).

Recommended procedure for probing paradigms

The following are the steps we have to follow:

1. Decide on the topic, area, subject matter, etc. For a first-time user, his own profession is recommended.
2. Determine the paradigm
3. Probe the paradigm
4. Map ideas in the mind
5. Connect ideas to produce new ideas
6. Harvest the ideas
7. Evaluate and select ideas
8. Refine the selected idea

Validation

In order to evaluate the results obtained from the technique, the author employed the *Kirkpatrick Level 1 Evaluation Model* (10) using a scoring system from 0 to 4, with 4 being the highest. He used especially designed questionnaires for different types of activities. The average of the majority of the results obtained ranged from 3.5 to 4. For scores lower than 3, appropriate revisions in the corresponding activities were made.

8 Some examples

Formulating teaching strategies and developing innovations

The first applications were on formulating teaching strategies. The author applied the technique in the first course in chemical engineering. Here the course was designed so that the topics were arranged in such a way that the students feel the lessons are always easy to understand; that is, they know all the principles for the topic at hand. Probing the paradigm enabled the author to write the appropriate textbook for the course. He introduced "chemical engineering sense" in which students are taught to how to estimate properties, quantities, and cost of materials, which are normally acquired through experience after they graduate. (Jose, 2009, 2012)

Introducing a new field of study

By using mass and energy balances of the human body as illustrative examples in mass and energy balance calculations (through probing the paradigm of chemical engineering), the idea of applying engineering principles (mass balance, energy balance, momentum balance, charge balance, and moment balance) to health and wellness arose. He introduced the idea in an international conference (Jose, 2010). He has offered "Health and Wellness Engineering" as a special topic elective in the graduate program at the University of the Philippines. Continuous probing of paradigms enabled him to invent products and processes concerning health and wellness.

Innovation for biotechnology and the environment

The author probed the paradigms of biochemical engineering and environmental engineering. He was able to design a wastewater treatment system that utilized waste materials as support for microbial biofilms. In bioreactors, microbial support allows the retention of the microorganisms, which intensifies the process. Further research led him to develop a support system comparable to those commercially available at a much lower cost. He has developed several types of fermentors and bioreactors for different applications.

9 Why paradigm has not been a basis of any technique in creativity

The word paradigm is a complex term, which Kuhn appropriated and freely used when he wrote his essay, "The Structure of Scientific Revolutions." He contended that paradigm shifts are necessary in order for science to advance. His essay was so compelling that the term paradigm became synonymous to the phrase "paradigm shift". The author of this paper read the essay only in the year 2001. He would not have been interested in pursuing the present work, had he read it before 1988.

10 Conclusion

The term paradigm is complicated and the phrase "paradigm shift" in the context of creativity can mean modifying a technique or using another technique. The author spent 25 years developing his method, mainly due to misunderstanding or opposition to the use of the term in his work. As presented in this paper, the technique is useful in generating ideas. The methodology is simple, but it requires other techniques in creativity to develop the idea. The suggested application is for one to probe his own profession and with practice, improve his creative abilities. Hopefully, the method will find some use in mainstream innovation management.

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Areas for feedback & development

As an engineer, I needed a method of generating ideas to be used in teaching and research. I always knew that creativity can be cultivated. My work always required new ideas, which I needed to avoid boredom. . My interest in paradigms led to an informal research. By knowing all the details about the paradigm of chemical engineering I did not expect that I embark in this research as a “hobby”. During the first 10 years, ideas freely flowed. I then made the process more systematic and called it “Probing Paradigms”. (I noted that the 10-year rule of the psychologists was applicable to me. I felt being an expert about paradigms.) Not being a cognitive scientist nor a psychologist, I speculate on what is going on in the mind. I could not properly answer the questions posed by the referee. The paper is kept short to minimize the errors. I am certain that this paper will elicit many questions due to the complexity of the term “paradigm”. The technique has been useful to me personally and my students in the last 15 years. I was not available to get any funding for this research. I could not even convince collaborators. I am grateful to the ISPIM for the opportunity for my work to be exposed.

Areas

The paradigm of a profession changes with time and distinct eras can be identified. .Can we use probing paradigms to identify future paradigms of professions?

Probing paradigms have some similarities with mind map or concept map. Could they have the same mechanisms when applied to creativity?

Do you agree that the essay of Kuhn is responsible for the current context of the usage of the term “paradigm”?

Brainstorming is unstructured and produces many unrelated ideas that are difficult to choose from. The method should be directed, structured, and domain specific. Can probing paradigms/ satisfy these requirements.

I did not present my idea that paradigms can be considered as fractals, which may make the theories of complex systems applicable. Can that be possible?

Questions by the referee:

Is human creativity rooted in mathematics or in action-centric context?

Is human creativity a mechanistic model or process?

Is a paradigm a concept or a complex artifact to visualize an idea/innovation or workspace?

How does paradigm probing relate to new agile approaches in visual modeling of architecture-driven enterprise workspaces and workplaces and workspace execution?