Application of Matrix Thinking Method to Introduction Program in Engineering Education

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Abstract

From a lot of survey, it is obvious that most students in universities lose their desire for learning just after entering their universities. In order to solve this problem, we developed a novel educational tool for the students, named “The thinking method based on matrix diagram”. If they try hard with the help of this tool, they will be able to learn how to design and manage their splendid university lives in addition to get the basic knowledge and to improve their basic abilities. It is also found that they can earn the shared knowledge mutually after learning a common method, which supports to make them to improve their communication abilities drastically.

Keywords: Engineering Education, Life Design Management Engineering, The Thinking Method based on Matrix Diagram, Seven Training Method for a Success in Life, Shared Knowledge

I. Introduction

Satoh, who is one of coauthors, has the lecture of the way to a good natured personality as a human being, from April 2008, at Yamagata University, where is his alma mater.

Although he builds up the new theory, Life Design? Management Engineering by using “The thinking method based on matrix diagram”, this is written in his book1) that he placed the practice management acquired by experience as a president for these 50 years in the base and constructed study. He is also a founder of the famous toy company, Takara, which makes so many products, for example, Rikka doll, Choro-Q (Penny-racer), Transformers, etc.

II. Conscious Survey of Students

He mentioned, after collecting descriptions of students’ impressions about schoolwork, and university lives.

a) They had an aim in order to pass the examination for the university according to learn by heart. As they cannot make new plans of school life after entrance, they are atrophied what they have come here this university for. They are easy to get, so-called “Syndrome for lack of objects”.

b) All students must be requested to acquire communication skills, and full creative skills, as well as to learn special subjects of study. However, they do not know what to do, how to do.

c) Although it makes also demands that they understand, decide, behave and manage themselves, they do not know what to do, how to do.

d) They do not know how to design their futures, ultimate goals. So, their hopes have vanished, and their motivations have dropped down. Finally, there is a marked lowering in students' scholarship.

e) University has not got supporting system ready for them, improving their abilities, cultivating their personalities, and leading them how to live, how to work, and how to study.

So, he developed an educational tool for the students, named “The thinking method based on matrix diagram”.

Received : December 4, 2009
Revised : April 6, 2010
Accepted : May 10, 2010
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III. Unification of Excellent Sciences

As wementioned above, he builds up his theory after integration of related studies, for example, Ethics and Metaphysics by Aristotle, System Engineering, Business Administration by Harvard Business School, and Brain Science by Ryuta Kawashima who is a professor of Tohoku University, and stands foremost among the living brain scientists.

The theory is shown on the [Fig. 1], in the part of relating studies.

IV. Outline of This Theory

When he was the president of Takara Co., he made use of the business management plan, which is composed with factors of personal affairs, constitution, finance, advertisement, products, sales, transportation, trade, and so on, as shown on the <Table 1>.

These factors stand one behind another on the vertical axis, and five elements which are analysis for circumstances changing, recognize current state, vision (purpose), venture (plan to do), victory (target or goal), form a line side by side on the horizontal axis.

He managed his company whether he was taking the best course, making the analysis of strong and weak points, checking the progress reports in his toy enterprise every day, in conformity with this frame.

He applies this management method to lead the supreme life, as shown on the <Table 2>. He takes into consideration that it is quite necessary to cultivate “Seven Knowledge Powers”, which is mentioned below, for having the best life. He calls it “Seven training method for a success in life”.

a) Morality: Literacy of morality in the way of life, for improving social service, ethical doing, manner, obedient to the laws, etiquette, etc.

b) Physical Health: Literacy of physical health, for improving good health, good appetite, mentally and physically training, etc.

c) Intelligence: Literacy of intelligence in the way of life, for improving technical knowledge, expert knowledge, good judgment, and so on.

d) Finance: Literacy of finance in the way of life, for gaining income, self-support, improving economic stabilization, etc.

e) Playful: Literacy of playful in the way of life, for entertaining (oneself and friends), enjoyinglife, amusing time, and so on.

f) Family/Home: Literacy of family/home in the way of life, for loving your family each other, and helping and supporting your family each other, etc.

g) Aesthetic: Literacy of aesthetic in the way of life, for improving aesthetic sense, aesthetic life, and so on.

V. What is a Happy Life?

If someone has too much money as not possible to
be able to be used, can you call this person a happy man or woman? However, if this person causes family troubles at home, or this person's health is not excellent, and this person's natural virtue is lacked, can you call this person a happy man or woman?

So, we modeled that any life consist of seven knowledge combination, and we think it is a first prerequisite in order well of the balance on “Seven Knowledge Powers”, as shown on the [Fig. 2].

We understand well when checking it by using this technique every day, the circle grows up, and turns out in various social experiments, for example, on lectures to civil servants training, managers training, and students at high schools, universities and so on.

VI. Three Processes of This Theory

There are three processes in this theory;
- Process of filling out the blank
- Process of expressing your opinions in public
- Process of doing PDCA cycle
  a) Process of filling out the blank
  When students fill up the blank of “Matrix Thinking Method”, they will know themselves, and they are able to take the self-cognition. That is to say, they will find out who they are, and they can get know satisfaction what it is they want.

  However, as we mentioned above, he teaches they must not put down on their personal seccreencies, so-called privacy.

b) Process of expressing their opinions in public
If they do not declare to show their signs of improvement on method of life, and method of study, putting out on their words in front of others, it is difficult for them to get rid of their bad habitual ways.

So, this process is installed for setting for mutual studying that there are a lot of points to serve as a reference to their way of life, after hearing other's announcements.

c) Process of doing PDCA cycle
As illustrated with a figure on the [Fig. 3], this Plan-Do-Check-Action (PDCA) process is the daily management system from morning to night. Putting it concretely, when getting up in the morning, they look at the filling in items, at first. Then, senses of hearing them by own ear are made to work aloud, checking own method of action during today, and confirming their schedule.

These processes are set from the viewpoint of Engineering Education.

VII. Grasping the Essential Qualities by David Garvin’s 3M Theory

Dr. David A. Garvin who is a professor of Harvard Business School presents “3M theory” that there are three steps for organization reformation2).

a) Meaning: The definition examined enough is necessary, which follows the action agenda. So, standard of behavior is required for everyone easy to foster mutual understanding.

b) Management: It is also necessary to present the concrete standard of behavior for enterprises than the abstract ideas.
c) Measurement: It is necessary to clarify the evaluation method for improving the perfection of this concerned organization.

As illustrated with a figure on the [Fig. 4].

Dr. Garvin mentioned that if these three M would become clear, people take an action for constructing studied organization-making, and the organization base is maintained and the effect can be expected.

Students made the concrete plans for becoming their own in the abstract articles of The Fundamentals of Education Law in Japan, using this 3M theory. It is easy for them, for example, to full development of personality, to cultivate a rich sensibility and sense of morality, to foster an attitude to acquire wide-ranging knowledge and culture, to develop a healthy body and so on.

VIII. Result of Analysis with “Seven Knowledge Powers”

The applicants of sophomore belonging to Industrial chemistry and Chemical engineering course at Yamagata University, took this lecture, from April 2008 to March 2009 and April to March 2010. They were organized 4~5 students per a group, in order to design better university lives by using the Matrix Thinking Method.

Student's comments are before taking this lecture, as bellows.

I have no purpose of university life, because my only purpose was to pass the entrance examination of university.

I have no interest in academic learning, and my interest is how to get passing score of each subject easily.

My purpose of university life is how to get good employment, and the point is good recruiting activity, no specialities / academic learning in university.

On the contrary, student's comments are changed after taking this lecture, as bellows.

a) I learn any everyday happening can easily be solved by acquiring the Matrix Thinking Method once. I also understand as it judges very for the problem to occur because of what, and to solve it, and how it is necessary to act immediately.

I come to be able to do the action that I foresee from a random action ahead.

b) Although I have nothing to take what kind of will and what kind of target, I lose sight what kind of humankind I am, and I exist in the condition similar to “a stray sheep”.

After thinking each factor using this method, I have been self-analyzed in detail, and I am able to be established.

c) I can take the success knowhow by this lecture. (Is there no such lecture up to now?)

The vague one becomes clear, and I can direct my course toward the target. I can take the correct direction if diligently reviewing, and advancing while correcting the goal, as I can.

d) Generally speaking, the difference is quite often caused in the content that the sender intended and the content that the receiver recognized. Also, it has a tendency to interpret it in one's own way without permission.

It has been realized for mutual understanding to be
able to advance instantaneously when this method is used, and to attempt communications.

Consequently, students made the pie chart of the weight of each element on “Seven Knowledge Powers”, under the influence of the successful life. They made the action plan which including the element, such as to have gratitude, to think positively, to accept other personality, to say thanks to everyone anytime, and so on, as shown on the [Fig. 5].

IX. Conclusion

We have so many possibilities to establish “The Encourage Education of Humanity”.

a) Students remembered their original purpose of university lives, applying “Seven Knowledge Powers” and Matrix Thinking Method.

b) Applying “Seven Knowledge Powers”, Matrix Thinking Method and framework of “3M theory”, students could understand and design concrete method for “full development of personality” (Articles of The Fundamentals of Education Law in Japan)

c) Students can get the system thinking technique through these works.

On the business management, we cannot undertake a dangerous management without a clear management plan, being equal to sail without the sea chart.

Students say that if they announce by using the same words and thinking while filling it in on the same format in front of their friends of the group, it has been recognized that it becomes easy to receive the partner’s understanding and cooperation.

“Shared Knowledge” of using same words, thinking on the same format, that is the most important will be born.

We are convinced that students by this study can deepen the mutual understanding in accordance with revealing an own insides, announcing and turning at the cycle of PDCA.

We can mutually understand not only superficial aspect, but also their senses, mental states, ideas and the mode of action.

As a result, it is possible for professors to grasp the students’ realities, and to cooperate with each other on the communications.

Reference


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