A Large Variety of Writing Instruments: Studying the Evolution of Technologies in Familiar Items

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Abstract

This paper reports the activities in Nakagawa's Seminar Class for the 2nd year students (with 10 members) in the 1st semester, i.e., from April to July 2010. The students selected (or were assigned to) this Seminar class just after reading my syllabus with the title shown above. Without any knowledge about technology development, systems engineering, creativity techniques, or, of course, TRIZ, the students started this class.

At first, for recognizing a variety of writing instruments, the students were requested to show their own items which they are carrying around at school and to describe the good points of their favourite items. Then homework was assigned to visit stationery stores and home-centers and to report about as wide variety of writing instruments as possible. Then they are advised to observe various writing instruments, to consider their mechanisms/principles of writing and their merits, and further to classify them in a hierarchical manner. Then the wide range of intended use were considered to specify 'what, on which, and how (during the process and as the results)' to write/draw, and were built up into a hierarchical system. The students gradually understood that with the requests of different use a variety of writing instruments have been developed, such as different in their mechanisms/principles, in shapes, in the characteristics of materials (e.g. inks), etc. This class is designed to make gradual understanding of the ways of evolution of technologies through familiar items, and understanding of important TRIZ concepts without using TRIZ terms.

Keywords

Education practice, Teaching TRIZ concepts without using TRIZ terms, Evolution of technologies, Familiar items**.**

The Seminar class for the 2nd year students were introduced last year in the curriculum of the Faculty of Informatics. The Seminar classes for the 1st year are dedicated for basic mathematics in the 1st semester and for the training of reading, writing, and presentation in the second semester. For the 2nd year students the Seminar classes are compulsory with selection among different topics delivered by teachers with their own intentions. Whereas for the 3rd and 4th year students, the Seminar classes are designed to proceed to the thesis work. Nakagawa conducts such Thesis Seminar Classes with the theme of 'Creative Problem Solving Thinking', and gives a relevant lecture in the 2nd semester for the 2nd year, as reported in [1].

The topic of Nakagawa's Seminar Class for the 2nd year students was announced as "Studying the evolution of technologies in familiar items: from a variety of writing instruments to input devices". Students who selected (or sometimes were assigned to) this class all wondered at first "for what purpose this class handles things like writing instruments?" and "are they relevant to PCs or IT?"

Exercises in the Seminar Class have been carried out as shown above in the Abstract. Teacher asks various questions and gives tasks, while students reply answers, do exercises and homework, and generate ideas.

In the first class, after self-introductions, the teacher requested the students: "Display all the writing instruments you now carry around at school", "Take a photo of them (with your mobile phone camera), and send the image via email to Teacher", and "Select one of your most favorite items and explain why you like it."

In the second class, students were requested to think of as many/different writing instruments as possible and to write them down on a Post-It-Note one by one. To use general names of product types In place of commercial product names; to draw simple sketches of the writing instruments, especially at the point of writing; and then to explain the basic mechanisms of writing, e.g. the mechanisms of writing with a pencil, with a ballpoint pen, with a pen, etc.

Then homework was given to visit a stationery store, a home-center, etc. for surveying real items of writing instruments in as much variety as possible. To watch and record every instrument for drawing/writing and every method of drawing/writing. The students were surprised with the large variety of writing instruments. For the survey, manufacturers' Web sites in the Internet are found very useful.

After listing up many writing instruments, students were requested to classify them, not in simple groups but in a hierarchical system based on the mechanism/principles of writing.

Then we went ahead to think of various needs/usage of such writing instruments. Students were requested to write down different usage in Post-It-Notes one by one, then to classify the variety of usage itself. What to draw/write and on which (medium) to draw/write were found most important categorization. How to draw/write was found significant next. How is the result and how is the process of drawing/writing are of further importance in the usage.

In the middle of the course, we decided to make a big report in collaboration of 10 students instead of individual reports. The report mainly consists of two comprehensive tables, i.e., Table 1. A variety of writing instruments hierarchically classified with their mechanisms and Table 2. A variety of writing instruments classified with their usage.

For summarizing the study, Table 3 was made by linking the writing/drawing methods with different usages.

Table3. Evaluation of various methods of writing/drawing for different usages

On which / Method	Ground	Wall	Board	Clothes	Paper	Stone	Ceramics	Glass	Metal	Plastics
Gives a damage	▲	▲	●	-	-	●	▲	▲	▲	▲
Leaves a part of itself as a trace	-	▲	●	▲	●	▲	▲	-	▲	▲
Adds a solid/powder	▲	▲	▲	▲	▲	-	▲	▲	▲	▲
Adds a fluid	-	●	●	▲	▲	▲	●	▲	●	●
Adds a liquid (ink, etc.)	-	●	●	●	■	▲	▲	-	▲	▲
Ejects a material (powder/ fluid/liquid/gas)	-	●	●	▲	●	▲	▲	▲	▲	▲
Puts a material inside the medium	-	▲	-	▲	-	-	▲	▲	-	▲

Note: Evaluation levels: high ■ ● ▲ - low

In the Seminar Class, no TRIZ terms nor TRIZ methods were explicitly explained nor used. However, the students learned important ideas/concepts forming the bases of TRIZ and system development. In the course of the Seminar Class, the students gradually understood that for fulfilling different needs of usage a variety of writing instruments have been developed by devising new mechanisms and that these form the process of evolution of technologies.

This paper was first presented at Japan TRIZ Symposium 2010 [2].

References

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