

No more math-phobias; dramatic improvement in the averaged scores in mathematics with a new self-learning textbook

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Edited by university professors; for more “Repetitive Exercises” and “Having fun”

For students who find themselves rather poor at mathematics, this textbook will be a real solution. A series of “Let’s Study Mathematics (Suken Publishing) came in public this spring after years of endeavor by two university professors. The textbook envisages a new contents scheme, granting students to learn mathematics even on their own. The authors of the textbook has made a point that elementary school education, particularly the school textbook used in class, should be held responsible for the decline of the academic standards among university students in Japan and their new textbook could make a difference. Although the textbook is beyond the official teaching guidance enforced by the government and not authorized, it has been gaining good reputation among academic authorities and there are dozens of successful episodes in subjected elementary schools to this new textbook, where the class average on a performance test has been dramatically improved by 12 points or more after the use of it. A private elementary school has even adopted this textbook as a side course material for all graders.

The authors of “Let’s Study Mathematics” are Kazuo Nishimura (58), Professor of Institute of Economic Research of Kyoto University, and Tsuneharu Okabe(59), Professor of Economic Department of Saitama University. They are also known as the authors of books “College students who cannot figure out fractions” and “College students who cannot figure out decimals,” both of which are alerting the deteriorated mathematical proficiencies among university students in recent years.

Deplorably, there are quite a few university students incapable of solving very basic mathematics questions, such as “simultaneous equations,” “four arithmetic operations,” and “subtractions of fractions with different denominators;” all of which the students were supposed to master by the second grade of junior high school. By investigating the root cause of this dishonorable reality, Professor Nishimura said, “we have discovered that the irrational composition of the current school textbooks underlie the problem. Mathematics or arithmetic requires repeating exercises until ideal proficiency is attained. To this end, we have been requesting the government to focus on this aspect and create a self-learning style of textbook through which students can learn mathematics even all by themselves. Since no conspicuous movement was seen in the direction despite our years of appeal, we have decided to meet the responsibilities by ourselves, about three and a half years ago.”

The most notable feature of “Let’s Study Mathematics,” is the composition of contents covering the range from the first year level to the sixth year all in mixture and in a repetitive upward spiral. Taking up the version for third graders for example, the first lesson is of “divisions,” followed by “proportions,” “fractions,” and “decimals” in the given order. Meanwhile, the authorized textbooks cover “decimals” at the fourth grade and “proportions” at the 6th grade with no sequential linkage in between. “We believe that these concepts are better to be understood in combination rather than independently, and also, starting to learn them as earlier as possible would ensure time for repetition to formulate a good understanding of the contents along the way.”

Starting to learn early-stages, following repetitive exercises, to gain a necessary level of proficiencies - this was a common proceeding of our mathematics learning in the ‘70s, but owing to the government policy of “Education at ease,” the progress has been stalled, and now we are seriously lagging behind the other countries in the pacing of learning. Currently, Japanese students do not learn “additions and subtractions up to two digits” until the second grade, which Indian and Korean counterparts learn at the first grade. “Additions and subtractions of fractions with the same denominators” is learned by the fifth graders in Japan, while learned by the

forth graders in Korea, and by the third graders in India. When it comes to the “fractions with different denominators,” Japanese students do not learn it until the 6th grade, while Indian counterparts finish it much earlier at the forth grade.” Our current school textbooks, after years of reduction in pages, are deprived of the reasonable sequence of lessons to be learned by students, Nishimura said.

“Besides, the teaching guidance in 2002 is imposing the guidelines that numbers of exercises included should be further down to one third of then current volume. Following years of relentless reduction in the contents by that time,” school hours assigned for student these days have ended down to one fourth of the length assigned for students in the 1950s.”

“Let’s Study Mathematics” provides step-by-step teaching methodology, with a few pages of introductory “Let’s think” in the beginning ; where overall concept of the lesson is explained in plain, but thorough expressions with many illustrations. Following these pages are sets of examples and solutions to help better understanding of children, and then their comprehension is tested through many exercise drills with answers section carrying detailed how-to tips. Since the primary purpose of this new style textbook lies with “ease of understanding for children,” intensive discussions, and sometimes heated debates, were held between the professors and voluntary teachers over propriety of the contexts, expressions, and lengths of sentences in use. Some sections were, facing these challenges, revised as many as 6 times for improvement to become as we can see today.

Professor Okabe said,” we worked this out for elementary school children to study mathematics with ease and fun. Using this textbook, they would learn even all by themselves without attending private tutoring school or asking teacher for more detailed explanations. We expect that arrival of this new style textbook will be a trigger for the government to review the current textbook, which is obviously too thin to learn all necessary contents in mathematics. Professor Nishimura said, “the government may have to realize that having less ‘math’ phobias would be conducive to having less “learning” phobias, and if children feel improved in mathematical proficiencies, they would be more proud of themselves and headed for more challenging goals.”

A teacher from an elementary school of Suginami-ward was helping with the edition of the new textbook, and he tried using the yet-unpublished version of it for his 4th graders about the lesson of “decimals.” The effects were so remarkable that, on an academic performance test conducted by a private education company; his class

achieved an exceptionally high averaged score of 89 points, well over the nationwide average of 78 points. Encouraged with the positive outcome, he continued to use the textbook to the target class, consisting of 26 students, even thereafter. On a following academic proficiencies test organized by the regional government in February this year, the class gained the score of 86.31 on average, far beyond the regional average of 73.9. As a consequence, performance achievement of this class was really rated 92.3% to the goal.

A private elementary school, “Notre Dame Elementary School “ in Sakyo-ku, Kyoto, accommodated to use this self-learning textbook as side course-material for part of the 4th graders and all of the 6 graders during the summer vacation programs. Given the satisfactory effects of the use, they have even decided to apply it to all school graders next year.

Yoichi Muguruma(32), Director of mathematics research group of this elementary school, said ,“frankly we were a little concerned at first, about using it for our children because the compilation does not follow the conventional sequence of lessons offered in the authorized textbooks. We were afraid that children might be unable to keep up from time to time along with the unknown sequence.” The textbook was nevertheless adopted by the school for a trial and their concerns were proven unnecessary. “Since the lessons in this textbook are given in a style of story questions, it offers students easy introduction even to rather complex mathematical concepts without unduly difficulties, such as “proportions,” which children often struggle for understanding. Besides the stories questions help encourage children to inspire images out of the given context. It surely nurtures their imaginative faculty. A repetitive loop of exercises can let them keep in check where they are in their overall knowledge and understanding about the subject at every opportunity. These are the merits more than we had expected and of real value,” said Muguruma.

Reportedly, an NPO in Seika-cho, Kyoto is now planning to edit an English-translated version of the textbook and send copies of it to developing countries. “This textbook is well recovering all the contents, cut out of the current school textbooks. Also it focuses on a systematic learning of contents to develop the ability of children to figure out how to solve questions by themselves. This will turn out to be a really significant asset for children in years to come. This textbook, from this viewpoint, should be rated to the world standard,” said Akio Kusui(62), a former principal of Seibo Gakuin Elementary school, Fushimi-ku, Kyoto, who retired the school the end of March this year. (By Toshihisa Yasumoto, Staff writer)