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A TRADITIONAL ASPECT OF MATHEMATICS EDUCATION IN JAPAN

— Mathematics as GEI (art), its JUTSU (technique) and DO (way) —

Maybe we were borne to play,
Maybe we were borne to amuse,
When I hear children singing in play,
I feel myself merrily shaking.
(Monk-Emperor Goshirakawa ed.: *Ryojinhisho* 1192,
translated by the author)

Abstract. This paper is fundamentally aiming to suggest some ways in which *all common pupils* would be enjoying mathematics and for this purpose I wish to take up some aspect of GEI- training that we can see in various traditional GEI still existing in our country.

The words "Mathematics as GEI" that you read in the subtitle of this paper is not my invention: it was borrowed from **Dr.Yoshio Mikami** (1875-1950), one of the eminent historians of mathematics in Japan. He said that "WASAN (traditional Japanese mathematics) was a kind of GEI", perhaps as tea-ceremony, flower arrangement, dancing and music, poems (Haiku, Tanka) and other folks cultures that still now can be seen in our country. GEI is the generic name including all of these traditional cultures. It is translated as "art" at present and it may be translated as "hobby" or "accomplishment" but all of them can't inform the delicate nuance of original Japanese.

Among many characteristics of GEI as a culture, here I mentioned two of them: one is the mind-training beside the acquirement of technique and the other is the respect to their teacher, and the implication from them will be discussed.

This paper includes four episodes and three anecdotes. Episodes are taken up to show the real present status of mathematics education of our country, and anecdotes are used to make readers understand the point of my argument which is treating such a vague concept as GEI.

This paper is closed with my hope: if mathematics education has some degree of the spirit of GEI, that I call *GEI-esprit*, mathematics will be joyfully learned by *all* young pupils, or at least, will not be so much hated as now.

1. SOME INTRODUCTORY REFLECTIONS

1.1. Present Status of Mathematics Education in Japan

If we summarize, according to the recent IEA report 1999, the present status of Japanese pupils' performance in mathematics, we can say that they do it fairly well as compared with other countries but they have a strong aversion to mathematics. If I say in a rather cynical way, it seems in our country that the aim of mathematics education is to make pupils hate mathematics and in this point we may have very much succeeded.

But, which of the next two cases is considered to be better: one is 'to be not so

T.H.E. Editors(s) (ed.), Book title, 1-.

able but like mathematics very much' and the other is 'to be able but do not like it'? I would prefer the former because if they like mathematics and even if they cannot do it so well at present, they may be expected to re-learn again when it is needed in the future, but in the latter case they will never return to mathematics throughout their later lives. In fact, a Japanese proverb says "What one likes one will be well."

From this point of view, I cannot be so optimistic as to appreciate the present status of mathematics education in our country. I often ask my colleagues or intimate school teachers: what is the residue of our effort in mathematics education. In reality, we could send college or university many students among whom splendid mathematicians or skillful users of mathematics in technology and science may be borne, but most of graduates leave high school with a bad impression toward mathematics and even if they were able in mathematics they will forget it very soon after leaving school, only remaining a big prejudices that mathematics was a very difficult and uninteresting subject.

To support this conjecture, I would like to introduce two episodes from my teaching experience. These episodes are something like comical stories and you may read it with a laughing but I wish you to know that they suggest the serious problem for us, mathematics educators, which can't make us remain with laughing. I also hope that these will be used as some documentations of a *qualitative* aspect in this ICMI-studies which were sought by co-chairs in their 'Discussion Document'.

Episode (1)

The first is an episode of a new student in the college where I was working after my retirement from a national university. In this college, one unit of mathematics was compulsory subject in the first year even for literature-course students. After the first day of my lecture he came to me with an irritating attitude and said: "I prefer this college to others because there was not mathematics among the entrance examination subjects, but why such a *math-hater* as me should learn mathematics again after the entrance?"

Recently in our country many universities or colleges, especially in their literature departments, tend to exclude mathematics from the entrance examination subjects aiming to gather as many students as possible under the rapid decrease of the young population. As a result, in the secondary school, students will not learn mathematics and other exact-sciences because they are useless in the entrance examination. We call this phenomenon in the secondary school as *mathematics-detachment* or science-detachment and now some people concerned in education have begun to worry seriously about it.

Episode (2)

The second episode was the one which happened when I was a young professor of a women's college. At the beginning of my first lecture I wished to know how much these students had been possessed of the secondary school mathematics and I put them a small test, in which, among others, I asked to write Pythagorean theorem (which is called "three squares theorem" in our country and I do so). To my surprise

there were very few who could do it (to my memory it was less than 20%), even though I emphasized it was not required to prove the theorem but only to write down the proposition. Some of them wrote only the formula: $a^2 + b^2 = c^2$. Then I asked one of them what meant a, b and c but the answer was a very shocking: she said, "I don't know, but isn't it trifling to know it?" Among other papers, the most impressive which I still remember was something like a letter to me, on which I could read as following: "I am very sorry I cannot do. Though I remembered until the graduation of the secondary school, it elapsed long time after leaving mathematics, and I've forgotten almost all of mathematics that I learned." Only several weeks elapsed since they left the secondary school, the amount of mathematics they had learned was heavily decreasing as above, and until they leave college and go into the society, it will rapidly tend to zero, I believed.

In our country, the Ministry of Education examined the level of pupils' ability of mathematics through an achievement-test almost every ten years, and it was usual to say that the result was almost satisfactory. But I think this result is not considered to be so much reliable to know how much they have acquired mathematics that will last long in their lives, because the test was held immediately after their learning; for instance in this test, knowledge of the 5th grade mathematics are examined at the beginning of the 6th grade. In order to know persons' real acquirement of mathematics we should examine adult people in the society for mathematics which was learned by them in their school time and still remains in them.

Generally speaking, what is really said to be the achievement of education, should be examined by the test like this to adult people in the society. But in reality it will be impossible, at least, very difficult to hold such an examination. In case of our country, however, I believe in my heart that the average mathematical ability of all adults may be equal to that of the 4th grade pupils. Most knowledge of mathematics higher than the 5th grade, if it was taught in schools, would be forgotten very rapidly when they begin their usual social lives. Mathematics education, is it such a vain human performance as this? If it were an economical enterprise, it would go bankrupt very soon under such a poor result as this.

Someone might say that: certainly they forget much of mathematics they have learned, but it happens only in such domains as knowledge and skills; however, mathematical attitudes, ways of thinking and abilities to solve problems, if they are well fostered through a good education, will still remain and continue to be maintained through their lives. I myself hope so, but we have not yet succeeded in showing this fact enough to persuade on it satisfactorily to the public and political authorities, and this is also the *status quo* of mathematics education as a scientific discipline in Japan and perhaps in many other countries.

1.2. Motivations to Learn Mathematics

With all these defects, why people make their children learn mathematics in such an eagerness? It's only because mathematics is the key subject of entrance examination to higher schools and a high schooling is believed to continue to a high status in the future society. Then, may we say, mathematics is learned only for the examination

not for its educational qualities?

But I think there are some other facts which suggest motivations or reasons to learn mathematics and in some degree encourage us, educators and researchers in mathematics education. In the following I will refer to some of them.

The first fact that I wish to show is that: most teachers in our country, especially in Primary Schools, believe that they teach mathematics not merely for the entrance examination, but they work for giving all children not only fundamental knowledge and skills but also habits and attitudes, which would be expected essential to develop their sound intelligence to think reasonably in their daily works and treat their personal problems logically. Some of parents may be unsatisfied with such teachers because their work do not seem to teach mathematics for the entrance examination, and they send their children to a special *Juku* (a small private school) after school to train them for the examination, but teachers in ordinary schools will not wish to be entirely involved in preparing children only for the entrance examination.

The second is the fact that there are still existing many *Soroban Juku* (small private schools for abacus). In our country, 'abacus' meant 'arithmetic' and was one of the 'Three Rs' until before the Meiji Restoration (1868) and after the introduction of western mathematics it has gradually fallen and today it only remains as a small topic in the 3rd and 4th grades mathematics. But while we can have an electronic calculator very cheaply, why some of parents send their children to this Juku which has no concern to the entrance examination? The director of "National Association of Soroban Education" says there are about 30 thousands Soroban Juku and 15 thousands teachers of it in the country. I think, in Juku like these, we can see a very interesting traditional atmosphere of mathematics education still existing and attracting pupils' mind. It is a spirit which can be seen in most of traditional ways of training in cultures.

Perhaps, some of you know that there are many traditional cultures which are taught not in schools but in a small Juku: for instance, that of tea-celemony, flower-arrangement, traditonal dancing, song, calligraphy, drawing, poem (俳句 *haiku*, 短歌*tanka*), etc. We call these traditional cultures as "GEI (芸, 藝)" and perhaps abacus is also still learned as one of these GEI. And in fact in our country there is an evidence that the traditional mathematics of our country which is called *wasan* (和算) in itself was considered to be one of these GEI and it is my intention in this paper to argue that even today's mathematics in schools may not be possessed of by children if it does not take a form of GEI. I wish to call this traditional mode of culture as "GEI-esprit" and to discuss what it is and in what form it is maintained, or should be maintained in mathematics education in Japan.

2. THE CONCEPT OF GEI

It was a historical necessity that many domains of Japanese culture have been influenced by the "CHC (Confucian Heritage Culture)" which was described in Prof. Wong's thesis in the Proceedings of ICMI EARCOME 1 in Korea in 1998, however, it need not to say that there are many other unique traditional features which are proper to our cultural field, even in today's mathematics education. As one of them, I

wish to notice in this paper on the GEI-esprit mentioned above in studying mathematics in schools.

What is GEI? Though it is very difficult to explain it especially to foreign peoples, it may be permitted for the present to be taken as a kind of self-culture or hobby which has no concern with earning money or making a living except in case of some professionals of it. Most students or learners of GEI of any kind, wish to learn it only because it's fun and may be given from it some good effects in living happily or sometimes could have a good reputation in their society.

To understand the concept of GEI, it would be important to know that its substance is manifested in the personality of its master (師匠, *Shishou*) and the master is the living model for disciples (弟子, *Deshi*) to follow in all respects. GEI cannot be studied through only books or manuals but through a direct personal guidance of their master or seniors who are certificated as the teacher by the master. For this sake, even today, in some GEI there are master-families (家元, *Iemoto*) which have inherited from their ancestors not only GEI itself but even the monopolistic right of certification to teach the GEI, for instance in tea-ceremony, flower-arrangement, traditional dancing etc. And it would be natural that they formed an association or sometimes a closed fraternity under the master and often competed with other ones of the same GEI field. This would be a weak aspect of the system of this society in developing their GEI but have a merit to maintain its uniqueness or purity for a long time.

The fact that this peculiar aspect of GEI was existing even in the traditional mathematics, was at the first time indicated by a historian of mathematics **Dr. Yoshio Mikami** (1875-1950) in the twenties of the last century in his study of *wasan*(Japanese mathematics) which had developed since the first half of the 17th century and ruined rapidly after the Meiji-Restoration (1868) with Westernization of our country.

Until around the end of the War II we had two eminent historians of mathematics, one of whom was Dr. Mikami above mentioned and the other was **Dr. Kin-nosuke Ogura** (1885-1962). They were colleagues in the same university and had almost the same opinion about the causes of the decline of *wasan*; these were the shortage of logic, little connection to philosophy and natural sciences, defects of symbolism etc. But with one point they were not in accord; Dr. Ogura said from his materialistic historical view-point that *wasan* had ruined for its 'guild'-like nature as we saw in the medieval ages in Europe, but Dr. Mikami insisted that there was not such a system as guild in this country: *wasan* was nothing but one kind of GEI and *wasan*-mathematicians had only enthusiastically enjoyed it without regard to any other things. I myself heard this fact personally from him soon after the War when I was a young teacher in a high school.

I think that in schools of our country, this atmosphere, so to speak, GEI-esprit may be implicitly existing in the mode of teaching and learning mathematics and if it is true, as someone says, that a decline of mathematics education is now beginning in schools of our country, it would be due to the shortage of GEI-esprit in mathematics education in recent years. Indeed, teachers in schools may be apt to become a mere living teaching machine with little attractive effect produced from

his/her own personality and humanity. To see the circumstances of today's mathematics education in Japan from this aspect, we should analyze the GEI-esprit more closely in its substance. In this regard I wish to mention two characteristics of GEI and its training.

(1) **Mind is aimed**: The first is that what should be learned in GEI is not only the technique but the mind which sustains the GEI from inside, and because of the possibility to be possessed of this mind, GEI has a good educational quality above the mere acquirement of the technique.

(2) **Teacher is crucial**: The second is that GEI is believed to be learned only through the personality of the teacher and cannot be taught without the direct guidance of the teacher.

In the following I would like to show these two unique characteristics of GEI-education with referring to some examples which are also quoted from domains other than mathematics education.

3. JUTSU (TECHNIQUE) AND DO (WAY) IN GEI

In GEI-training we may discern two features of it: one is JUTSU(術, technique) and the other is KOKORO(心, mind) which supports the technique from inside. To acquire the technique with a good mind is the ultimate aim of students and it would be given under the personal guidance of their master who him/herself had already attained this aim in a higher degree after the severe training process. This training is often compared to the walking of a long way and in this sense GEI-training, emphasizing the feature to have the sound mind, is often called as GEI-DO (芸道), where "DO (道)" means "way" and it implies the training process to follow in order to acquire the GEI in the most proper sense. GEI which aims to have the technique exclusively may be called GEI-JUTSU (芸術, artistry), but if it has little support of such a mind as above, it is looked down as merely GEI-TO(芸当, feat) with a little change of spelling from GEI-DO. In most of GEI in our country, most people, except someone who wish to be professionals in their GEI, learn GEI in aiming to have a mind through the GEI-training besides becoming an expert of its technique, because such a mind would be very valuable for living soundly in any other field.

About the first characteristic mentioned above in (1), I wish to allude to JUDO (柔道) which is our traditional sport and now has worldwide spread. But in former time JU-DO was called JU-JUTSU (柔術) and was one of martial arts, that is, a warrior's technique to fight against the enemy in the battle field. Then, when and why JU-JUTSU changed to JU-DO? It was in 1882 in Tokyo when **Jigoro Kano** (1860-1936), who is called "the father of JUDO", opened his training-hall KODOKAN (講道館).

Since his younger days, he had a strong intention to revive the decayed JUJUTSU as a practice to train young men's body and mind and this plan had developed to open his private training hall. On the occasion of the inaugural meeting of this hall he made a speech which was worthy of attention to know the distinction between JUTSU and DO even from the viewpoint of mathematics education. In the following some lines are introduced from this speech. Though they are a little long, I

wish to quote them from an English edition of his biography.

> "It's no reflection on any of you, but nowadays few men of good character would pursue an interest in jujutsu for long. Those who do are generally roughnecks, men who are fond of fighting or who don't have enough mental discipline to get an education. My own belief is that jujutsu training should improve a man's character as well as his physical powers. I hope you agree."
>
> "In my opinion the ideal should be to prevent fights, to promote education, and to cultivate good manners and civilized behavior."
>
> "From today we will no longer practice jujutsu. We will practice something new, which we call judo".
>
> "As you know, the word *jujutsu* is composed of two parts: *ju* means "gentle or flexible" and *jutsu* means "technique". The *ju* of judo is the same as in jujutsu - we will preserve gentleness and flexibility - while *do* means "path or way". In judo, we will focus above all on the way - the path itself. Technique will be secondary to achieving an understanding of the way. To train men of good character for life, judo is the ideal way." (Watson, *Judo*, 51)

Mathematics is not a sport and all assertion quoted above may not be applied to mathematics education. But most essential parts of today's school mathematics are not the technique, which should not be forced to all children to be acquired completely. As a subject of common education, mathematics should be considered to be materials to train pupils' intelligent part of their personality and should be organized as such in curriculum as well as in its teaching. What is to be learned is not only the *technique* but the *way* to develop their personality—it is the fundamental recognition in learning GEI for common (not professional) peoples and it should be also the primary motivation to learn mathematics for common pupils.

We can find out the distinction between JUTSU and DO even in today's school mathematics of our country. In our current study of mathematics education, we often discern the aims of this education into two parts; one is called 'substantial aim' and the other 'formal aim', and the former implies to acquire mathematical knowledge and skills, while the latter means to be equipped with good intelligent attitude and habit, which will be perhaps corresponding to the mind in GEIDO. In the 'Mathematics Program' issued by the Ministry of Education of Japan which is the current national curriculum of mathematics, we can read in its outset the 'Overall Objectives' which is the aim of mathematics education through *all* grades, as follows: (I mention here, as an example, only that of the Lower Secondary School which is compulsory for all pupils.)

> "For the students to understand deeply the fundamental concepts, principles and rules relating to numbers, quantities, figures and so forth. For students to acquire methods of mathematical expressions and strategies, and to improve their abilities to relate phenomena mathematically. For students to enjoy mathematical activities, to appreciate the importance of mathematical approach and ways of thinking and to inculcate in them the right attitudes necessary to make use of mathematics." (Japan Society of Mathematics Education, *PROGRAM*, 21)

While the two aims, 'substantial' and 'formal', referred above are so much blended or even mingled in this quotation that we cannot easily separate the two clearly, here is an atmosphere to stress the formal aims than substantial ones. But in 'Objectives' (aims) of *each* grade mathematics, this Program alludes only to

substantial aims, for instance, to understand equation, to deepen understandings on properties of figures etc. and it's natural that teachers are apt to incline to stress the substantial aims only under today's severe competition in the entrance examination. It is in this inclination that we can see a clear sign of the decline of GEI-esprit in our country.

4. TEACHER AS A MODEL OF LEARNING

Here we will be concerned about the second characteristic of GEI which I mentioned in (2) of Chapter 2.

In all counties which were under the Confucianism educational influence, it may be a common tradition of education for a pupil to pay a high respect to his teacher, and in the training of GEIDO of our country it is the essential attitude for disciples to entertain a high respect for their master in order to be well possessed of GEI and without such a respect it is believed to be impossible to have a good success, because the teacher (master, 師匠, *shisho*) him/herself is regarded as the incarnation of GEI or the model for students (disciples, 弟子, *deshi*) so as to be in accord with his/her personality under his/her direct guidance.

Today this aspect of teaching and learning might be seen in the most typical form in SUMO-wrestling which is still favorite traditional professional sport and still maintains the habits of its original appearance. In SUMO, the authority of master is almost absolute for disciples, because the master himself walked the severe way of training in his carrier of his younger ages and is believed to manifest all JUTSU (technique) and KOKORO (mind) in his whole personality.

Here I never wish to insist that the teacher of mathematics should be like the master of SUMO, but I only wish to suggest that there is an important factor of teaching which is inevitably concerned to the personality of the teacher, especially if we wish to regard mathematics as an activity proper to human mind instead of seeing it as a mere technique pragmatically useful in life. I wish to say that the teacher should not be satisfied with a mere transmitter of technique like a teaching machine but should be a good personal model for pupils in enjoying and using mathematics actively and effectively, and in this regard we can well refer to the mode of teaching and learning in GEIDO.

In fact, there may be two modes of teaching and learning in anything, one is done enough only in using books or manuals, while the other is intrinsically needed to be done under the teacher's personal guidance. This distinction of education was well known from early ages in our country. A typical example can be read in the recent historical novel of **Ryotaro Shiba**: *Kukai no Fukei* (Scenery of Kukai, 1975). I would like to introduce one of its scenes:

Kukai (778-835) was a monk, the founder of a Buddhist sect. When he returned from China, another monk **Saicho** (767-822) was already a top leader of Buddhist society of our country. Saicho was heard that Kukai returned with a new sutra of Buddhist, and asked him to borrow it from him to know the new doctrine of Buddhist through it. But, in spite of repeated requests of this elder senior in this religion, Kukai will not lend it and at last he refused with a letter in writing almost

as follows:

> "The essence of this new doctrine could not be understood only by reading a sutra, and if you really wish to know it, come to me by yourself, I will teach it personally."

Here we should remember that Kukai was a mere young junior and Saicho was the greatest elder senior at that time.

Since very olden times, 'being taught personally from teacher' (師承, *shishou* in Shiba's terminology) instead of 'learning only through books' (筆授, *hitsuju*) was a common mode of teaching and learning not only in Buddhist society but in many traditional cultural regions of our country. Though the latter is a common mode of learning explicitly pervaded in today's classroom, but the former mode would be implicitly imbedded in the teaching of mathematics especially in primary school level, and the shortage of this mode may be a cause of decline of mathematics education and produce many math-haters and math-dropouts.

If mathematics can be seen as an activity of human mind, it could not be taught or learned merely through a mechanical procedure, because it would be a very complex and delicate activity, Certainly mathematics is a cognitive subject, but to learn it we need to have a good emotion toward it. Emotions like this may be too delicate to express in words or letter. It may be possible only through the whole personality and humanity of teacher. For instance, can a teacher really help their pupils to like mathematics if he/she hates mathematics? Can a teacher teach mathematics successfully unless he/she is loved nor respected by pupils?

To my great regret, recently in our country, we sometimes hear that pupils did violence to teachers. Especially the teacher of mathematics may not be respected but be mostly hated from pupils for his/her transcendental attitude.

If a teacher is a model of mathematics learning for pupils, teacher education is the most crucial to improve mathematics education, and in our country it would be the responsibility of universities, especially its department of education. But in our country, mathematics professors are not eager for teacher education but for mathematician education.

5. FASCINATION OF GEI

Among trends which have effected the recent reformation of school curriculum in our country, there are two great ones: *globalization* and *equalization*. The former is clearly indicated in the Discussion Document of this ICMI Study, and I wish to be concerned with the latter.

First of all we should notice the fact that in the historical origin there was not a direct relation between the primary education and the secondary education and they had developed almost independently; the former was for children of common peoples and the latter was for a few intelligent elites who were expected to be future scholars or social leaders. But after the War Ⅱ, especially in the secondary level the curriculum made for these few elites has been equally imposed to all children under the name of 'popularization of secondary education' and in responding to the strong public claim of equalization; all children were forced to learn mathematics that is

needed only to a very few intelligent elite children in former time.

It will be suitable to introduce here another episode which I saw in a drama of TV some years ago:

Episode (3)

It happened in a mathematics classroom of a secondary school that a student suddenly stood up and asked his teacher saying: "My father keeps a Chinese restaurant and makes and sells Chinese noodles everyday, but I never saw that he used mathematics like this factorization and others in his work. I am asked to succeed his work in the future. Why such a man like me should learn mathematics like these?"

The teacher persuaded him anyhow or others, but after returning to his room he began to wonder seriously why he as a teacher should teach such a mathematics to such a pupil; he might be able to persuade his pupil but could not persuade himself!

Since then, it has become my custom to tell this story to my students of future teachers and asked: "If you were this teacher, how do you persuade this pupil?" Answers were of many varieties and were very interesting, however, I will not talk about it in further detail. But I only wish to say that it is originally no good to make a pupil ask such a question: if this pupil is really enjoying mathematics, he would not ask such a 'philosophical' question. In most GEI-trainings learners will not ask such a question, perhaps because GEI has a unique attraction even if it has much pain to bear. Indeed in *juku* of mathematics they seem to attend joyfully even being tired after school. Perhaps education in *juku* has something similar to GEI-training in its nature.

GEI-DO may be well defined as a systematized hobby so as to be understood by foreigners. In our country this systematization of GEI as a culture had begun since very old time; for example, in tea-ceremony (茶道, *sado*) and flower- arrangement (華道, *kado*), it began during the 14th-15th century. But long since before then, GEI was existing with a close relation to human nature.

In this respect it will be interesting to know that at the early ages of the 12th century the **Emperor Goshirakawa** (1127-1192) indulged himself deeply into the learning of a kind of folk songs, *Saibara*, and collected them and edited a book on it, from where I have introduced a poem at the beginning of this paper. It was said that he devoted himself too much in learning it as almost forgetting food and sleep. GEI has such a kind of fascination and induces the whole human mind to learn and enjoy it.

GEI-DO is a long way to be possessed of the GEI; it resembles very much to a travel with its various pains as well as many enjoyments. It has a strong attraction to human nature in its nature, and even if it happens that its training give some pains or troubles with it, they will be overcome by this irresistible attraction. If mathematics and its learning has the form of GEI, it will become a great effective materials as a school subject for *all common pupils* as well as for some elites.

6. CONCLUDING REMARKS

As I said before, the product of GEI-training is not only the technique but rather the mind which accompanies the training, and to have this mind is the real aim of the training, especially for common peoples other than those who wish to be the professional of this GEI. This mind would be demonstrated, for instance in the case of tea-ceremony, in making his/her daily behavior elegant or reasonable. If mathematics learning is reformed as really compared to GEI-training, the effect of learning would be seen in learners' way of thinking or activities in many domains of their future lives and because of this effect mathematics would be able to occupy its exceeding place among school subjects for all pupils.

I will close this paper with one more episode. If it has any implications, I hope, they will be left to the readers' own consideration.

In our country, equalization of education is seemed to be misunderstood, even among educational authorities, as if it can be realized merely by level-down of contents or reduction of difficulties; especially in mathematics, they seem to believe that all pupils can learn the same mathematics by doing so. It may be also a reaction against the education in the past which was too much academical, as if all pupils will be mathematicians in the future.

Episode (4)

After the recent reformation of the national curriculum in which difficult topics were almost reduced, I happened to meet one of my intimate principals of the Lower Secondary School and asked him if the population of pupils who like mathematics increased more than before. He decisively replied:

"No, absolutely no! Incapable pupils are still incapable and dislike mathematics even if it became easy, and more than that, able pupils left from mathematics because it became easy and trifling for them. Then, the population of math-haters has increased more than before."

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