



A Comparative Study on the Problem-Solving Skills in Mathematics of Secondary School Students in Thailand and Japan: A Case of Equation

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The purposes of this paper are to show some errors, which committed by the Thai and Japanese students as well as student's attitude towards mathematics. The subjects of this study were first grade students in lower secondary schools of Thailand and Japan that were randomly chosen as samples. The researcher made the equation test and questionnaire written in two languages. The errors committed by the students were collected, classified and tallied in a master list.

This study proved that equation errors were committed by both Thai and Japanese students not only on verbal equation but also on simple equation. The most frequently committed errors by both Thai and Japanese students were using equal property and failure to understand the problem.

Thai and Japanese students committed different type of errors. Thai students were likely to commit much type of errors more than Japanese students were. Japanese students were more aware of the process to solve equation more than Thai students were. Moreover, Japanese students have a tendency, although not high, to explore many type of plans to solve the problem, for instance trial and error and making diagram.

The Japanese students were able to solve the equation more than Thai students. Though Thai students spent more time in studying outside of classroom hours and have a high tendency attitude towards mathematics than Japanese students.

The reasons, which the attitude towards mathematics of both students produced, differ in each country. Thai student ranked firstly mathematics could be applied in other subjects, secondly mathematics sometimes is easy, sometimes is difficult and thirdly mathematics is useful in daily life. While Japanese students ranked firstly mathematics sometimes is easy, sometimes is difficult, secondly mathematics is difficult and thirdly mathematics has so many formulas to memorize.

1. Introduction

The process of learning equation almost inevitably generates mistakes, which become the stumbling block in the path towards understanding mathematics. One reason for this state of affair is that students seem to find equation is difficult. One possible way of trying to find out what make equation difficult is that to identify the kinds of error students commonly make in equation and to investigate the reason for this error. In addition, equation is assigned to study from lower secondary school student grade I to grade III thus the key to understand equation becoming one of the key areas of study in lower secondary mathematics.

Miwa (1985, (3)) point out that in Japan, as in other countries, pupils are rather proficient in simple computation but not in verbal problems. In general, ever growing hours of pupils devoted to TV and to comic magazines

influence seriously on them and pupils become less proficient and less interested in reading. Verbal problems in mathematics are under these influences too, and many pupils are not positive to solve verbal problems and performance is unsatisfactory. Likewise in Thailand, many studies were focused on topic of equation. The result of those studies were found almost familiar, for instance, Kittiwisit (1994, (1)) studied A Construction of a Mathematics Diagnostical Test focusing on equation, her result of the study found that for the first test, students' weakness were found regarding step order in properties, dividing properties and multiplicative properties. For the second test, students' weaknesses were found regarding mistranslation problem, no complete translating problem and the change language of symbols to multiplicative. In concordance with a pilot of this study, the researcher asked some Thai teachers about the topic of equation. They said that some Thai students have problems of this topic. For example they did not understand how to use equivalent property to solve problem and how to translate from verbal problem to the language of mathematical formula that agree with Polya (1973, (4)) said 'the difficulties which we may have in setting up equation are difficulties of translation.

With the idea mentioned above, the researcher become interested on the topic of equation especially verbal equation. Moreover, as a participant of 21st In-Service Training Program of Overseas Teachers who had a chance to observe many classes of school in Japan, she was impressed with the enthusiasm of the Japanese teachers and students. So new ideas stroke the researcher to have a comparative study on the problem-solving skills in equation of lower secondary school students of Thailand and Japan. The result of this study will be benefit of teachers to understand the frequent errors committed by Thai and Japanese students in solving equation.

2. Methodology of the Study

The subjects of this study were the first grade students in lower secondary schools in Thailand and Japan that were randomly chosen, as samples. The researcher made the questionnaires and equation test written in two languages. The errors committed by the students were collected, classified and tallied in a master list. Statistical Treatment is to analyze data simple frequency, and percentage distribution was used.

3. Results of the Study

The results of the study were presented in 3 parts such as student's attitude towards mathematics, problem solving skill, which comes by their answers test of equation as well as analysis of students' errors.

3.1. Student's attitude towards mathematics

The subjects of this study were students derived from Thailand 162 persons compose of male 70 persons and female 92 persons, in Japan 136 persons comprise of male 68 persons and female 68 persons. To determine the student's attitude towards mathematics by using the questionnaire which has 5 options given: Like it very much, Like it, Undecided, Hate it and Hate it very much.

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Mostly students in Thailand chose like mathematics (58.02%) and like mathematics very much (19.14%). Students in Japan seemed not decided whether they like mathematics or not with 34.57 % while 28.69 % of students like mathematics. While 22.06% of Japan students hate mathematics very much, Thai student hate mathematics only 3.70 %

Thai and Japanese students different reasons on attitude towards mathematics vary differently. Thai students ranked firstly mathematics could be applied in other subjects, secondly mathematics sometimes is easy, sometimes is difficult and thirdly mathematics is useful in daily life, 15.88%, 13.05% and 12.26% respectively. While Japanese students ranked firstly mathematics sometimes is easy, sometimes is difficult, secondly mathematics is difficult and thirdly mathematics has so many formulas to memorize, 19.29%, 13.20% and 11.68% respectively.

It may imply that Thai students like mathematics because mathematics could be applied in other subjects though sometimes they feel it difficult and sometimes easy. Also they realized that mathematics is an important subject and useful in their daily lives. Some Thai students like mathematics because they like the mathematics teachers. However, some students view mathematics as difficult subjects because of the many formulas to memorize. Furthermore, students feel bored with mathematics because it has a lot of homework.

While Japanese students seem not decided whether they like mathematics or not because they found sometimes mathematics is easy, sometimes is difficult. Some found that mathematics has so many formulas to memorize this made it more difficult and some found that mathematics is really difficult. But some students feel very glad when they solved the problem given and get the correct answer. Further, both Thai and Japanese students share common realization mathematics is useful in daily life.

Most of Thai students (27.78%) spent around 1 hour and some around 30 minutes (27.16%) in studying mathematics outside school hours. The reason for this might be because 4.72% of Thai students have a lot of homework to do so they have to spend time for it. While most of Japanese students (33.83%) did not spend time for studying mathematics outside school hours. It maybe because they have only a few of homework to do. While 29.41% and 20.59% spend time around 15 minutes and around 30 minutes respectively in studying mathematics outside school hours. Which is less time spent in studying mathematics outside school hours compared with Thai students.

3.2. Problem solving skill, which comes by their answers test of equation

The researcher made open-ended answer equation test, which is composed of formula equation 4 items and verbal equation 3 items for checking and enumerating the error given by the students. Both of Thai students and Japanese students have percentage of correct answer as show in Table 1.

Table 1 indicates that most of the items, Thai students found it difficult to solve and they are ineffective except in item number 1 they got the highest percentage of correct answer. Almost Thai students, the percentage of correct answer is around 35 – 46 % except item number 7, Thai student cannot solve it. The maximum incorrect percentage of answer is item number 5, 42.59% and the minimum is item number 1, 5.56%. The missing

answer percentage rank is higher from item number 1 to item number 7. The maximum missing answer percentage is item number 7.

Table 1. student's problem solving skill

Item Number	Percentage of answer(%)					
	Thai students			Japanese students		
	correct	incorrect	missing	correct	incorrect	missing
1	92.59	5.56	1.85	81.16	14.49	4.35
2	45.06	37.66	17.28	40.30	49.25	10.45
3	45.68	32.10	22.22	89.86	10.14	0
4	45.68	30.86	23.46	89.55	10.45	0
5	33.95	42.59	23.46	56.52	24.64	18.84
6	35.19	28.39	36.42	0	31.34	68.66
7	0	13.58	86.42	19.12	28.67	52.21

For Japanese students, they can do item number 3, 4 as well as 1 in high percentage of correct answers, 89.86%, 89.55 % and 81.16% respectively. Besides that, they are ineffective on other items. They cannot solve item number 6. The maximum incorrect percentage of answer is item number 2, 49.25% and the minimum is item number 3, 10.14%. The maximum missing answer percentage is item number 6, 68.66% and item number 7, 52.21%.

Table 1 showed that item number 1, both Thai and Japanese students can do it completely and they got high percentage correct answer. It might be because it is a simple equation and it is easy to solve. The researcher also noticed that item number 3 and 4; Japanese students did not miss to answer. While 45.68% of Thai students, did not solve both equations number 3 and 4.

According to table 1 the researcher remarked that the relation between the percentages of correct answer and missing answer have an indirect variation. For instance, the answer of Thai students, item number 1, while the percentage of correct answer is high; the percentage of missing answer is low. Likewise, item number 7; while the percentage of missing answer is very high, the percentage of correct answer is 0%.

It may imply into 2 ways, firstly, it is directly influenced with their ability. If the students can do the test, they will not miss the answer. Likewise if they cannot do the test, they might not solve equation. Secondly, the time to do the test or the intention to do the test might be influence on the percentage of correct answer as well. The remark point is the missing answer percentage rank of Thai student is higher from item number 1 to item number 7. It may imply that in the beginning students have high intentions to do the test and maybe less in the last item so many Thai students did not solve the last item. Furthermore, it is noted that both students in Thailand and Japan have a high tendency to have a high missing answer percentage in the last item.

3.3. Analysis of students' errors

According to the answer of equation test, both students in Thailand and Japan made many errors. First, analysis of

Thai student errors then will be presented the analysis of Japanese student errors and lastly, the analysis of the errors committed by Thai and Japanese students. The researcher discussed using the idea based from their errors, an analysis of both mathematics textbooks in topic of equation of Thai textbook and Japan textbook and an analysis errors committed by both Thai and Japanese students. Furthermore the research will add her viewpoint when she had a chance to observe the mathematics classes of Thailand and Japan classes even in Japan she had only a few chances to observe that. Moreover the research gathered and displayed what errors committed by students by showing some sample errors, which were the most common errors or some special errors, which Thai and Japanese students got different percentage of correct answer.

3.3.1. Analysis of Thai students' errors

The incorrect responses given by Thai students were classified into 3 major categories, enumerated below:

- 1) Variation of the distributive property.
- 2) Errors in signs/ Change side-change sign error.
- 3) Failure to understand the problem.

According to the answers of equation test indicated that the most error committed were in using equal property, the error in signs/ Change side-change sign error. This may imply that the students solve the equation without first having a good foundation or a mastery of the previously learned concepts especially the concept of equal property. Another most commonly committed error, as expected, was failure to understand the problem. Some students lack the ability to correctly translate the problem to formula equation.

Errors due to language difficulty were also observed. Based from table 1, verbal problems, item number 5 and 6, Thai students around 45% can solve those problems. While item number 7, Thai students cannot solve it. Looking closely with their answers and the mathematics textbook of lower secondary school of Thailand, the researcher found some causes of the errors as follows:

Item number 2) $5x - 3/2 = 1$

The students have a tendency to operate this equation by using concept of the least common multiple. Since they learned the least common multiple in the first semester that they are more familiar with that content more than a new mathematical concept as equal property. But they did not have a mastery of that concept so they have some errors as shown below:

$\begin{array}{l} \dots \frac{5x-3}{2} = 1 \\ \dots \frac{5x-3+2}{2} = 1 + \frac{2}{2} \\ \dots \frac{5x-1}{2} = 1 + \frac{2}{2} \\ \dots 5x - 1 = 1 + \frac{2}{2} \\ \dots 5x = 1 + \frac{2}{2} + 1 \\ \dots x = \frac{1 + \frac{2}{2} + 1}{5} \end{array}$	$\begin{array}{l} \dots \frac{5x-3}{2} = 1 \\ \dots 5x-3 = 1 \times 2 \\ \dots 5x-3+3 = 2+3 \\ \dots 5x = 5 \\ \dots \frac{5x}{5} = \frac{5}{5} \\ \dots x = 1 \end{array}$	$\begin{array}{l} \dots \text{การคูณทั้ง 2} \\ \dots \frac{5(1)-3}{2} = 1 \\ \dots \frac{5-3}{2} = 1 \\ \dots \frac{2}{2} = 1 \\ \dots 1 = 1 \end{array}$
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As mentioned above, Thai students lack the efficiency in using equal property even though they know that this

equation should be solved by using it. Some students also did not use equal property with every variable. It may imply that Thai students did not understand well the concept of equal property. They frequently misapplied and made errors in manipulating the equation. Some sample errors as follow:

Item number 3) $6x - 3 = 2x - 9$ and number 4) $5x + 3 = 3x - 5$,

Both items number 3 and 4 were created from the same idea of each unknown variable in both sides. Both of these items, 45.68% of Thai students can solve them, besides cannot. The errors given by students are the weakness in equal property and error in signs/ change sign-change side error.

The contents in mathematics textbook of lower secondary school of Thailand reflect that most of equations are in one unknown variable in one side only. So students were not familiar with those equations with the two unknown. Unfamiliarity and not having much experience to face and solve that kind of unknown variable in both sides of equation could be the cause of the errors and inability to solve such problem solving in equation.

Some sample of the errors as below:

$$5x - (3 \div 2) = 1$$

$$5x - (3 \div 2) \cdot 2 = 1 \times 2$$

$$\frac{5x(3)}{3} = \frac{2 \times 3}{3}$$

$$x = \frac{6}{5}$$

$$5x - \frac{3}{2} = 1$$

$$x - \frac{3}{2} = \frac{1}{5}$$

$$x = \frac{5}{5} + \frac{3}{2}$$

$$x = \frac{2}{10} + \frac{15}{10}$$

$$x = \frac{17}{10}$$

$$6x - 3 = 2x - 19$$

$$6x + 2x = 19 + 3$$

$$\frac{8x}{8} = \frac{22}{8}$$

$$x = \frac{22}{8}$$

$$6x - 3 = 2x - 19$$

$$6x - 3 + 3 = 2x - 19 + 3$$

$$6x = 2x - 16$$

$$6x - 2x = 2x - 2x - 16$$

$$\frac{4x}{4} = \frac{-16}{4}$$

$$x = -4$$

$$6x - 3 = 2x - 19$$

$$6x - 3 + 3 = 2x - 19 + 3$$

$$6x = 2x - 16$$

$$16 = 2x - 6x$$

$$16 = -4x$$

$$\frac{16}{-4} = \frac{-4x}{-4}$$

$$-4 = x$$

For verbal problems, as expected, was parsing error and failure to understand the problems. Mostly of Thai students lack the ability to correctly translate the problem to formula equation. On the process to get the formula equation, Thai students inevitably failed to understand the problem, which becomes the stumbling blocks to solve the problem. In items number 5 and 6, the researcher adopted the pattern of the problem from textbook of lower secondary school of Thailand. That is the reason why the percentage of correct answer of Thai students in item number 6 higher than Japanese students did.

Item number 7) At present Boy-A is 12 years old and Mr.B is 39 years old. When the age of Mr.B becomes 2 times of the age of Boy-A?

While item number 7, the researcher adopted the pattern of the problem from textbook of lower secondary school of Japan so all of Thai students cannot do it. Moreover the patterns of Thai's problems did not have questions about future things events (e.g. age of people). Item number 7 was very difficult for Thai students.

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Because they have to be aware that when time pass they have to add x to both of the age of Boy-A and Mr.B. Not only add for only one.

$$\begin{aligned} X \cdot 3 &= 1000 \\ \frac{X \cdot 3}{2} &= \frac{1000}{2} \\ X &= 333.33 \end{aligned}$$

This implies that the experience to solve familiar problems will affect ability of students to solve the problem. The sample given by students as right:

Item number 5) Sayoo-jan has some money in her wallet. Her father gave three times more than she has. All in all she got 1000 yen. How much money does she has before her father gave her?

The common error in item number 5 was that student forgot to use all the data of problem especially they forgot that before her father gave money to Sayoo-jan (3x), she has her money before (x) so almost students got a wrong formula as shown below:

Item number 6) There are 27 boys in a class and the girls comprise 1/3 of all students more than 3. How many girls in a class?

The other type of errors was that student forgot to use all of data of the problem especially they forgot that the girls comprise 1/3 of all students more than 3. Besides that other mistake is students try to use all of number in questions which including in problem but they did not understand problem so well thus they made a wrong equation as right.

$$\begin{aligned} \frac{1}{3}a &= 27 \\ \frac{1}{3}a \times 3 &= 27 \times 3 \\ a &= 81 \end{aligned}$$

This error is given by student lack one important data of problem, which the girls comprise 1/3 of all students more than 3 not less than 3 then he made a wrong equation.

$$\begin{aligned} 27 + (\frac{1}{3} \times n) &= n \\ 27 + (\frac{1}{3} \times n) - 27 &= n - 27 \\ \frac{1}{3}n \cdot \frac{3}{3} &= (n - 27) \cdot \frac{3}{3} \\ 2n &= -27 \\ n &= -27 \end{aligned}$$

$$\begin{aligned} 27 + x &= 27 - x \\ 27 + x - 27 &= 27 - x - 27 \\ x &= -x \\ x + x &= -x - x \\ 2x &= -2x \\ x &= -x \end{aligned}$$

3.3.2. Analysis of Japanese students' errors

Japanese students have a high tendency, to correct simple equation more than verbal problem. The incorrect responses given by the students were classified into 2 major categories, enumerated below:

1. Variations of the distributive of property especially item 2. (Dividing property)
2. Failure to understand the problem.

According the error as showed below indicated that the most error committed was the mistake to use equal property especially dividing property.

For simple equation, the percentage of correct answer of item number 1, 3 and 4 are higher than that of item number 2. Surprisingly! Why only 40% of Japanese student can solve item number 2?

Based from their answer proved that Japanese students lack the ability of equal property especially providing and multiplicative property as well. The sample of errors were shown below:

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$\begin{aligned} 1) \quad 5x - 3/2 &= 1 \\ 10x - 3 &= 2 \\ 10x &= 2 + 3 \\ 10x &= 5 \\ x &= 2 \end{aligned}$	$\begin{aligned} 10x - 6 &= 2 \\ 10x &= 2 + 6 \\ 10x &= 8 \\ x &= 2 \end{aligned}$	$\begin{aligned} 50x - 15 &= 10 \\ 50x &= 10 + 15 \\ 50x &= 25 \\ x &= 2 \end{aligned}$
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The researcher got the answer when she studied the textbook of lower school student of Japan. As reviewed, the textbook have many samples of equations but mostly of them are in pattern of integral number. It has no example in fraction as shown below. So it might be the reason why student seem to be familiar with integral number.

例題2 方程式 $9x - 5 = 22$ を解きなさい。

解答▶

$$\begin{aligned} 9x - 5 &= 22 \\ \text{両辺に } 5 \text{ を加えると, } 9x - 5 + 5 &= 22 + 5 \\ 9x &= 27 \\ \text{両辺を } 9 \text{ でわると, } x &= 3 \\ \text{答 } x &= 3 \end{aligned}$$

Excerpted from Japan textbook p.77 (2)

例題3 方程式 $15x - 4 = 3x - 28$ を解きなさい。

解答▶

$$\begin{aligned} 15x - 4 &= 3x - 28 \\ -4, 3x \text{ を移項すると, } 15x - 3x &= -28 + 4 \\ 12x &= -24 \\ \text{両辺を } 12 \text{ でわると, } x &= -2 \\ \text{答 } x &= -2 \end{aligned}$$

Excerpted from Japan textbook p.79

Moreover, from their answers, all of Japanese students used the equal property to solve this question. Noone use concept of least common multiple to solve item number 2 as Thai students did. Likewise the researcher saw some example in Japan Textbook demonstrated the process to use equal property to solve the question as shown below. An obviously reason why Japanese student did not use concept of least common multiple to solve item number 2.

例題1 方程式 $\frac{1}{2}x = -3$ を解きなさい。

解答▶

$$\begin{aligned} \frac{1}{2}x &= -3 \\ \text{両辺に } 2 \text{ をかけると, } \frac{1}{2}x \times 2 &= (-3) \times 2 \\ x &= -6 \\ \text{答 } x &= -6 \end{aligned}$$

Excerpted from Japan textbook p.77

Thus it may imply about the ways to solve the problems, students have a tendency to use the familiar process as students have experienced to solve the problem.

Another most commonly committed errors in verbal problems, as expected, were parsing error and failure to understand the problem. Some students lack the ability to correctly translate the problem to formula equation.

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In items number 5 and 6, the researcher adopted the pattern of the problem from textbook of lower secondary school of Thailand. That was may be the reason why the percentage of correct answers of Japanese students is low especially item number 6, Japanese students cannot do it. Furthermore the pattern of verbal problems in textbook of Japan has in type of the velocity, the length, the age, and the purchase(for example buy ticket, cookie etc.). Furthermore the types of equation almost have a tendency in term of multiple variable, not that kind of having “more than” or “less than”. Therefore Japanese student did not have this kind of experience so much thus they made a lot of mistake as follow:

$$\begin{array}{l} \text{女の子の人数を } 2x \text{ とする} \\ 21 = 3 = 3x = 3 \\ 7 \times 3 = 21 = 3x = 3 \\ 7 = x \\ x = 7 \\ \text{A, 7人} \end{array}$$

$$\begin{array}{l} \text{女の子の人数を } x \text{ とする} \\ B \text{ の } 21 = x \\ 3x = x = 21 \\ 2x = 21 \\ x = \frac{21}{2} \end{array}$$

$$51 + 15 = 2x \quad x - 2x = -51 \quad -5x = -51 \quad x = \frac{51}{5} = x = 10.2 \quad \text{A, 10.2}$$

While item number 7, the researcher adopted the pattern of the problem from textbook of lower secondary school of Japan so only few of Japanese students can do it. Because item number 7 was very difficult for them. They have to be made aware that when time pass they have to add x to both of the age of Boy-A and Mr.B. Not only add for only one.

This may imply that the experience to solve the familiar problem will directly affect the ability of students to solve the problem.

Also, mostly students did not understand the meaning of the problem so they made a lot of mistakes. Some student said that it is impossible that the age of B-san will become 2 times of the age of A-kun. Some students used trial and error by dividing or multiplying or subtracting age of A-kun and B-san as shown below. Some of errors committed by students as follow:

2倍になる事は出来ない。

B君の年齢が A君の年齢の2倍になる年々後がある

$$12 - 9 = 6$$

A, 6年後

Even if some students cannot solve the equation, they try to think out of it by creating symbols or diagrams as below:

A君の年齢をxとする。

$$12x = 36 \times 2$$

$$12x = 72$$

$$x = 6$$

A, 6年後

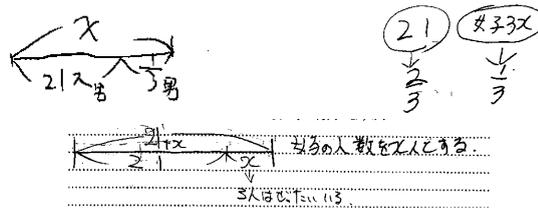
$$12 + 2x \times 2 = 39 + x$$

$$12 + 2x = 39 + x$$

$$2x - x = 39 - 12$$

$$x = 27$$

They try to solve item number 6



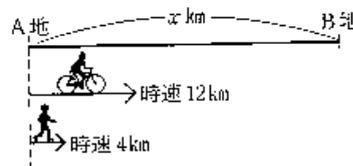
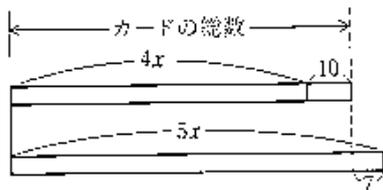
For item number 7, some students cannot create the formula equation from verbal problem. But they try to have trial and error by drawing a line link up data from problem. The one who understood the meaning of the problem very well even though he cannot create equation, he made diagram for solving problem. Fantastic! He got a correct answer. It is very good idea.

12	13	14	15	16	17	18	19	20	
39	40	41	42	43	44	45	46	47	
21	22	23	24	25	26	27	28	29	30
48	49	50	51	52	53	54	55	56	57

A, 15年後

27
 $\frac{27}{3} = 9$

When looking back to the textbook of Japan, in order to easily understand, all of the sample in the textbook always demonstrate how to operate the problem with pictures, diagrams etc, as shown below:



Excerpted from Japan textbook p.86

Excerpted from Japan textbook p.87

Thereby the student got this idea in their mind so when they solve the problems; they have a high tendency to think through the pictures, diagrams. In her view, it is very useful idea for student to use this way to analyze, understand and finally get the answer.

3.3.3. Analysis of the errors committed by Thai and Japanese students

Based from Table 1 the errors were not only on verbal problem but also on simple equation and based from 3.3. Analysis of students' errors, the most frequently committed errors by both Thai and Japanese students were the mistake of using equal property and failure to understand the problem.

Thai and Japanese students differ in the type of errors. Thai students were likely to commit much type of errors more than Japanese students were. Japanese students were more aware of the process to solve equation more than Thai students were. Moreover, Japanese students have a tendency, although not high, to create many type of plans to solve the problem, for instance using diagrams in order to analyze the problem.

For verbal problem, one of the effects on the way to face problem is students have experience to do it before or not.

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Student can solve the problem if he is familiar with it. For example item number 6, the researcher adopted the pattern of the problem from textbook of lower secondary school of Thai so Japanese students cannot do it. On the other hand, item number 7, the researcher adopted the pattern of the problem from textbook of lower secondary school of Japan so Thai students cannot do it.

Based from their answers equation test, Thai and Japan's textbook, including the experience from the classes observed in Thailand and Japan, the researcher has the following suggestions based on the result of the error given by Thai and Japanese students;

1) The same errors given by both Thai and Japanese student on error in equal property because of misunderstanding the concept of equal property. In her view, not only the equal property but also other concepts are necessary in the process to solve problem. So a good foundation or mastery of the previous learned concepts should be considered because it might become the stumbling block in the path towards solving problem.

2) Students are familiar with the process and the idea to solve equation as what they learned in a class and what they read in the mathematics textbook. So students have a tendency to use the familiar concept and process to solve problem by imitating the process same as they were gained. Thereby let students experience these problem solving and give them plenty of opportunity to imitate and practice which is the best way to help them develop their problem solving skills.

3) According to the mathematics textbooks, students follow the way, which they learned in mathematics class. Also in general, the teachers used textbook as a guideline to teach students. It was affect on the student ideas towards solving problem. Thai textbook has emphasis on the process to solve problem and has a few examples to demonstrate how to analyze problem and how to get the plan to solve it. Whereas Japan textbook show a lot of examples, how to analyze problem and how to get the plan of process to solve it by using diagram, picture etc. Moreover the Japan textbook has a tip underline the problem which seem very useful for student to find the answer with ease and find themselves contentment and happy learning and doing mathematics as one reason given by Japanese student that "when he can solve problem, he is glad". Furthermore Japan textbook is more colorful and attractive to student than Thai textbook.

4) By the researcher, have different ways in teaching mathematics to students. Japanese teachers usually introduced the topic to students by using "open-ended question" on the board then let students use many instruments which teachers prepared for helping students to acquire the answer easily and understand by themselves. So Japanese students were familiar to solve problem by creating the plan by them from kindergarten level until higher education. This became a part of Japanese students' attitude in solving. Therefore Japanese students have a tendency to find out answer by many ways for example trial and error, use diagram to analyze the problem. While Thai teachers teach students by using chalk and talk. It is meant that students have to follow the ideas which given by teachers so they lack ability to create idea to solve problem by themselves.

5) It was also note other reasons such as the time to do the test, the effort to do it and others, though not so high but the errors committed by students showed that. These reasons influence the percentage of correct answer.

Especially in the last item, Thai students have a high missing answer percentage. It may imply that they feel boredom with the test so they did not do it or the time is not enough thus they cannot finish the test on time. Furthermore maybe they knew that the test has no effect to their score so they were lazy to do the test. Anyway according to the missing answer percentage presented those Japanese students have a high effort to solve the problems more than Thai students do.

The reasons and suggestions above support the result of this study on why Japanese students have a high percentage of correct answer than Thai students do.

4. Conclusions

This study proved that equation errors were committed by both Thai and Japanese students not only on verbal equation but also on simple equation. The most frequently committed errors by both Thai and Japanese students were using equal property and failure to understand the problem.

Thai and Japanese students differ in the other type of errors. Thai students were likely to commit much type of errors more than Japanese students. Japanese students were more aware of the process to solve equation than Thai students. Moreover, Japanese students have a tendency, although not high, to explore many type of plans to solve the problem, for instance trial and error and making diagram.

The Japanese students were able to solve the equation more than Thai students. Though Thai students have a high tendency attitude towards mathematics than Japanese students.

Thai and Japanese students reasons on attitude towards mathematics vary differently. Thai student ranked firstly mathematics could be applied in other subjects, secondly mathematics sometimes is easy, sometimes is difficult and thirdly mathematics is useful in daily life. While Japanese students ranked firstly mathematics sometimes is easy, sometimes is difficult, secondly mathematics is difficult and thirdly mathematics has so many formulas to memorize.

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