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Current Status and Issues in Japan's Education and Academic Policies in Light of PISA and TALIS Surveys

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I. OECD PISA Survey

1. What is PISA (Programme for International Student Assessment)?

- Objectives: To measure to what extent 15-year-old students who are at the completion phase of compulsory education can utilize learned knowledge and skills to deal with issues they face in various real-life settings.
- Target: 15-year olds (First grade of senior high school in Japan)
- Fields:
 - “Reading Ability”
 - “Mathematical Literacy”
 - “Scientific Literacy”
 - Problem-solving Ability (2003, 2012, ...)
 - Student Question Sheet, School Question Sheet (questionnaires)



➤ Schedule

- Conducted every 3 years since 2000
- **PISA2012**
 - Conducted a computer-based survey, in addition to a pencil-and-paper survey (International option)
 - Published Results
 - December 2013
Mathematical Literacy (central field), Reading Ability, Scientific Literacy
Digital Mathematical Literacy, Digital Reading Ability
 - April 2014
Problem-solving Ability (2003 and 2012)
- **PISA2015**
 - Shift to full-fledged computer-used survey
 - 3 fields (Scientific Literacy as the central field) + Joint Problem-solving Ability
- **PISA2018**
 - 3 fields (Reading Ability as the central field) + Global Competency (under-development)

2. Overview of PISA2012 (Mathematical Literacy, Reading Ability, Scientific Literacy)

Survey Summary

- To assess to what extent 15-year-olds, who are at the completion phase of compulsory education, can utilize knowledge and skills for issues they face in various real-life settings.
- To conduct surveys in three fields comprising reading ability, mathematical literacy, and scientific literacy every 3 years since 2000, and examine focusing on mathematical literacy as the central field in the 2012 survey.
- Approximately 510,000 people from 65 countries and territories participated. In Japan, approximately 6,400 people among first grade students in 191 senior high schools, upper secondary schools and specialized vocational high schools participated. (Conducted in June and July 2012.)

Result Summary

- In all, the average scores in 3 categories - mathematical literacy, reading ability and scientific literacy - attained their highest levels since the surveys in which average scores can be compared.
On the basis of levels of academic achievement, the data has also been showing that the ratio of the lowest rank segment of Level 1 or below is decreasing, and the ratio of the upper rank segment of Level 5 or above has been increasing since the 2009 survey.
 - With respect to mathematical literacy, average scores have significantly increased since the 2006 survey, when average scores had dropped.
 - With respect to reading ability, average scores have continued to increase significantly since the 2009 survey.
 - With respect to scientific literacy, average scores have significantly increased since that of 2006, with which they can be compared.
 - The percentage of students interested in mathematics, or who feel the usefulness of mathematics, has significantly increased, compared to the 2003 survey.

● Countries and Territories with Higher Scores than the OECD Average among all 65 Participating Countries and Territories

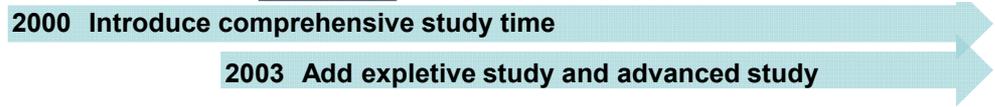
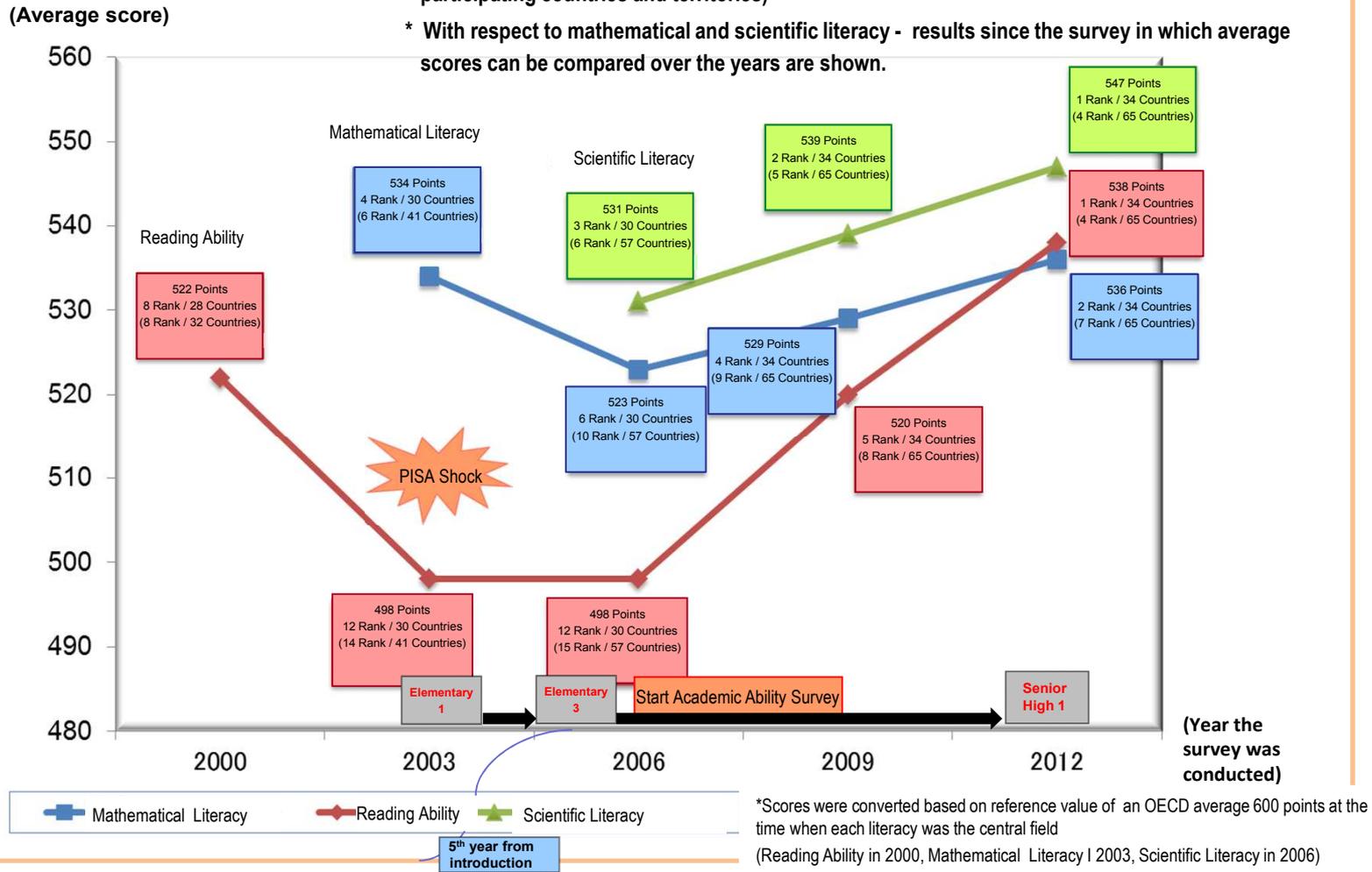
	Mathematical Literacy	Average scores	Reading Ability	Average scores	Scientific Literacy	Average scores
1	Shanghai	613	Shanghai	570	Shanghai	580
2	Singapore	573	Hong Kong	545	Hong Kong	555
3	Hong Kong	561	Singapore	542	Singapore	551
4	Taiwan	560	Japan	538	Japan	547
5	Korea	554	Korea	536	Finland	545
6	Macao	538	Finland	524	Estonia	541
7	Japan	536	Ireland	523	Korea	538
8	Liechtenstein	535	Taiwan	523	Vietnam	528
9	Switzerland	531	Canada	523	Poland	526
10	Netherlands	523	Poland	518	Canada	525
11	Estonia	521	Estonia	516	Liechtenstein	525
12	Finland	519	Liechtenstein	516	Germany	524
13	Canada	518	New Zealand	512	Taiwan	523
14	Poland	518	Australia	512	Netherlands	522
15	Belgium	515	Netherlands	511	Ireland	522
16	Germany	514	Belgium	509	Australia	521
17	Vietnam	511	Switzerland	509	Macao	521
18	Austria	506	Macao	509	New Zealand	516
19	Australia	504	Vietnam	508	Switzerland	515
20	Ireland	501	Germany	508	Slovenia	514
21	Slovenia	501	France	505	Britain	514
22	Denmark	500	Norway	504	Czech	508
23	New Zealand	500	Britain	499	Austria	506
24	Czech	499	U.S. A.	498	Belgium	505
25	France	495			Latvia	502
	OECD average	494	OECD average	496	OECD average	501

* ■ non-OECD member country.

Change in Average Scores and Ranking

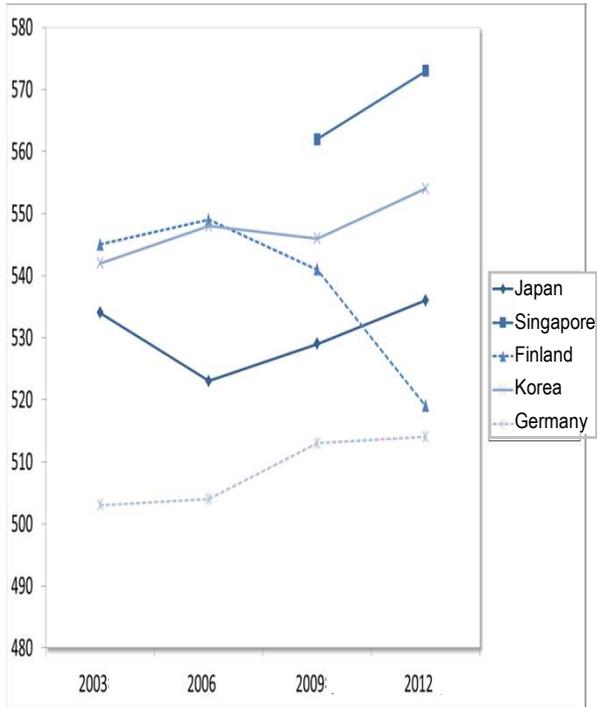
* Ranking among OECD member countries. (Number in parentheses shows ranking among all participating countries and territories)

* With respect to mathematical and scientific literacy - results since the survey in which average scores can be compared over the years are shown.

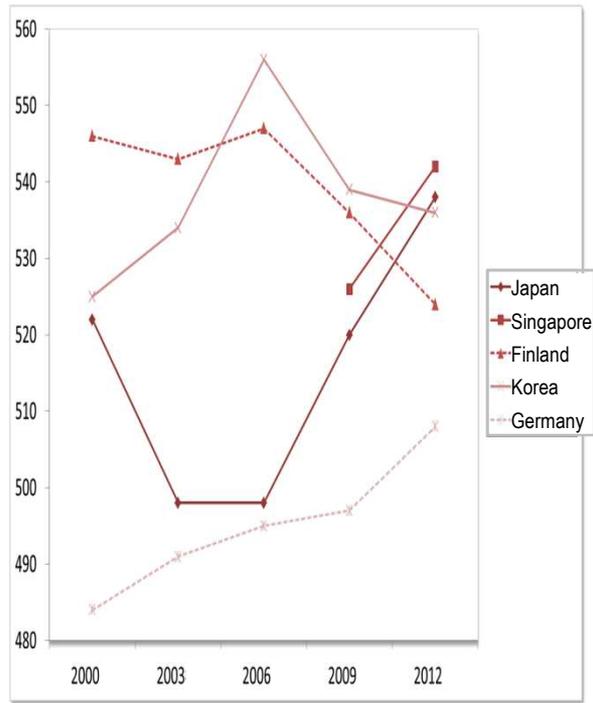


Change in Average Scores Per Country

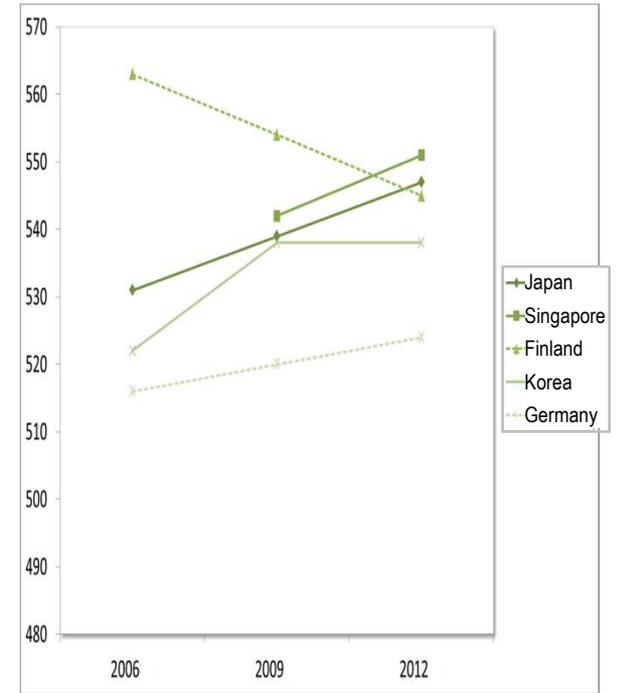
Mathematical Literacy



Reading Ability



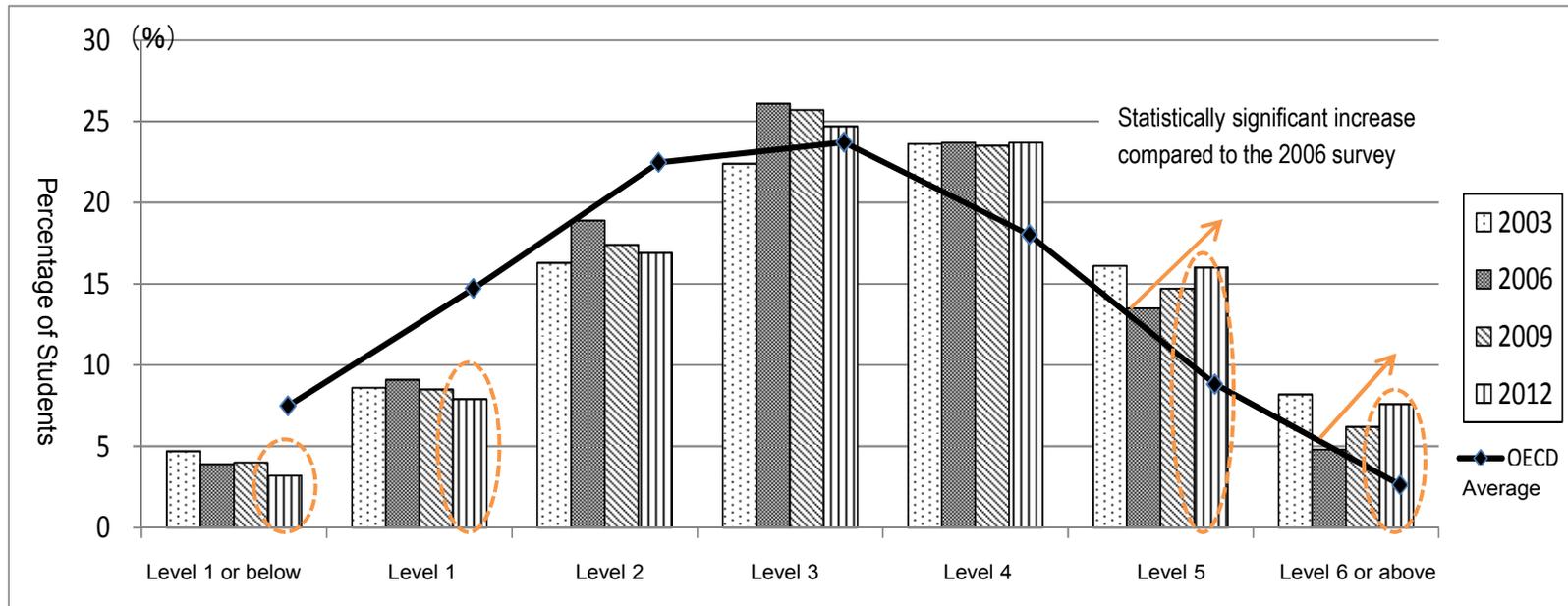
Scientific Literacy



Change in Percentage by Levels of Academic Achievement

Mathematical Literacy

The lowest percentage of students with Level 1 or below after 2003, and the percentage of students with Level 5 or above has significantly increased, compared to the 2006 survey.



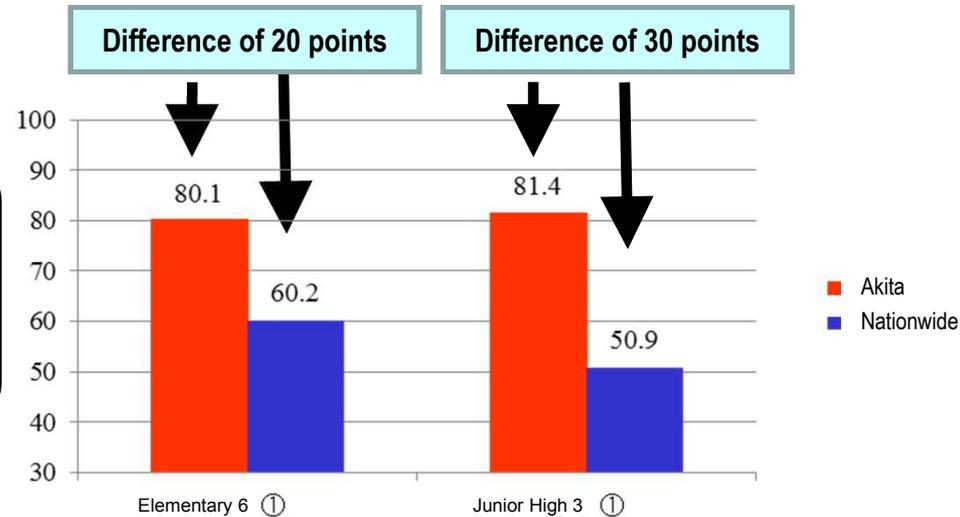
Reading Ability and Scientific Literacy also show the same tendencies

[Reference] According to the 2013 National Academic Ability and Learning Status Survey, Akita Prefecture has an extremely high percentage of children working on activities matching the point of “comprehensive study time”, and there are large differences in no answer rate and correct answer rate (particularly for B questions).

1. Difference in efforts for “comprehensive study time”

Are you working on learning activities such as setting up an assignment by yourself, collecting and organizing information and making a presentation of what you examined during “comprehensive study time”?

* Totals of 1. “Yes” and 2. “More likely than not.”



2. Difference in no answer rate

○ Elementary School, Japanese Language B

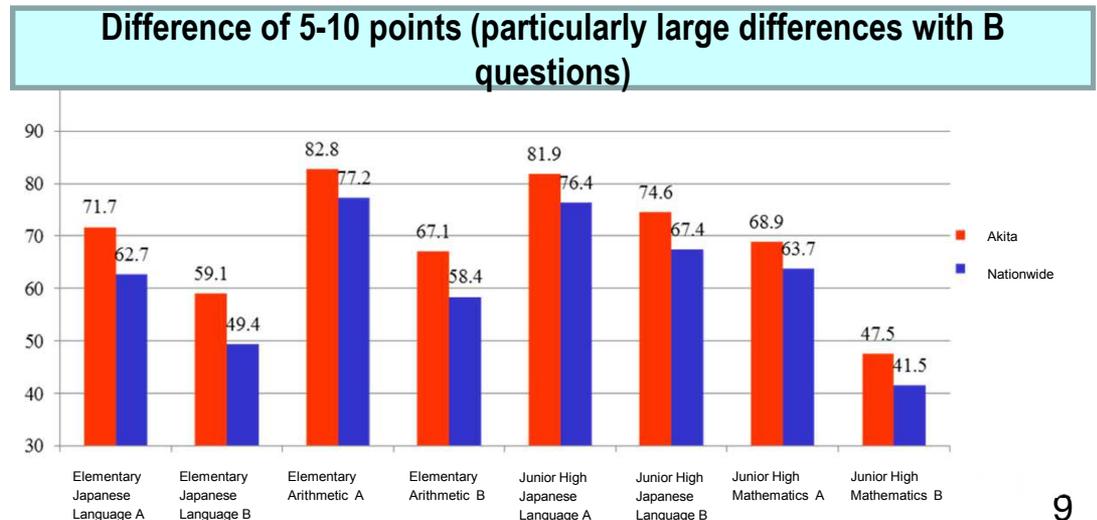
Akita 61.5
Nationwide 135.9

○ Junior High School Mathematics B

Akita 152.2
Nationwide 267.1

* The above figures are the totals of no answer rates for each question.

3. Difference in correct answer rate



3. Problem-solving Ability (PISA 2012)

Results Summary

- The average score in our country's Problem-solving Ability category is 552 points. Japan is ranked second among 28 participating OECD-member countries, and third among all 44 participating countries and territories.
- With respect to levels of academic achievement, Japan has the second lowest percentage of low rank segment of Level 1 or below, and third highest percentage of upper rank segment of Level 5 or above, among all 44 participating countries and territories.

■ Countries and territories scoring higher than the OECD average among the 44 participating countries

	Name of Country	Average scores		Name of Country	Average scores
1	Singapore	562 points	12	Estonia	515 points
2	Korea	561 points	13	France	511 points
3	Japan	552 points	14	Netherlands	511 points
4	Macao	540 points	15	Italy	510 points
5	Hong Kong	540 points	16	Czech	509 points
6	Shanghai	536 points	17	Germany	509 points
7	Taiwan	534 points	18	U.S.A.	508 points
8	Canada	526 points	19	Belgium	508 points
9	Australia	523 points	20	Austria	506 points
10	Finland	523 points	21	Norway	503 points
11	Britain	517 points		OECD average	500 points

* ■ non-OECD member country.

OECD Analysis

Box V5.7 Development of problem-solving skills and assessment in Japan: Comprehensive study time

Japan achieves top or close-to-top results in all subjects according to the PISA 2012 survey, and 'problem-solving' is no exception. Further, Japanese students who averaged 552 pts performed better than students at the same level in terms of mathematics, reading ability and science in other countries and territories. This is significant in comparison with middle- and low-ranked students. In the problem-solving survey, Japanese students in level 4 or below in mathematics, reading and science, score 20pts. better than students at the same level in other countries. (Chart V.2.6: p.163-164) A contributory factor is thought to be our focus on developing problem-solving skills among all students in Japan. Such problem-solving skills are developed by student participation in student-driven activities through a cross curriculum for both subjects and comprehensive study.

The Japanese Government in the late 1990s introduced "the fortitude to live" approach in the revised curriculum guidelines, which meets Japan's curriculum standard. The purpose of this approach was to make students think critically and creatively, identify problems themselves and develop their abilities to solve them. This reform was an important innovative change in directing the flow to inquisitive and student-centered study. The reform's core was the need to have students work eagerly and enthusiastically.

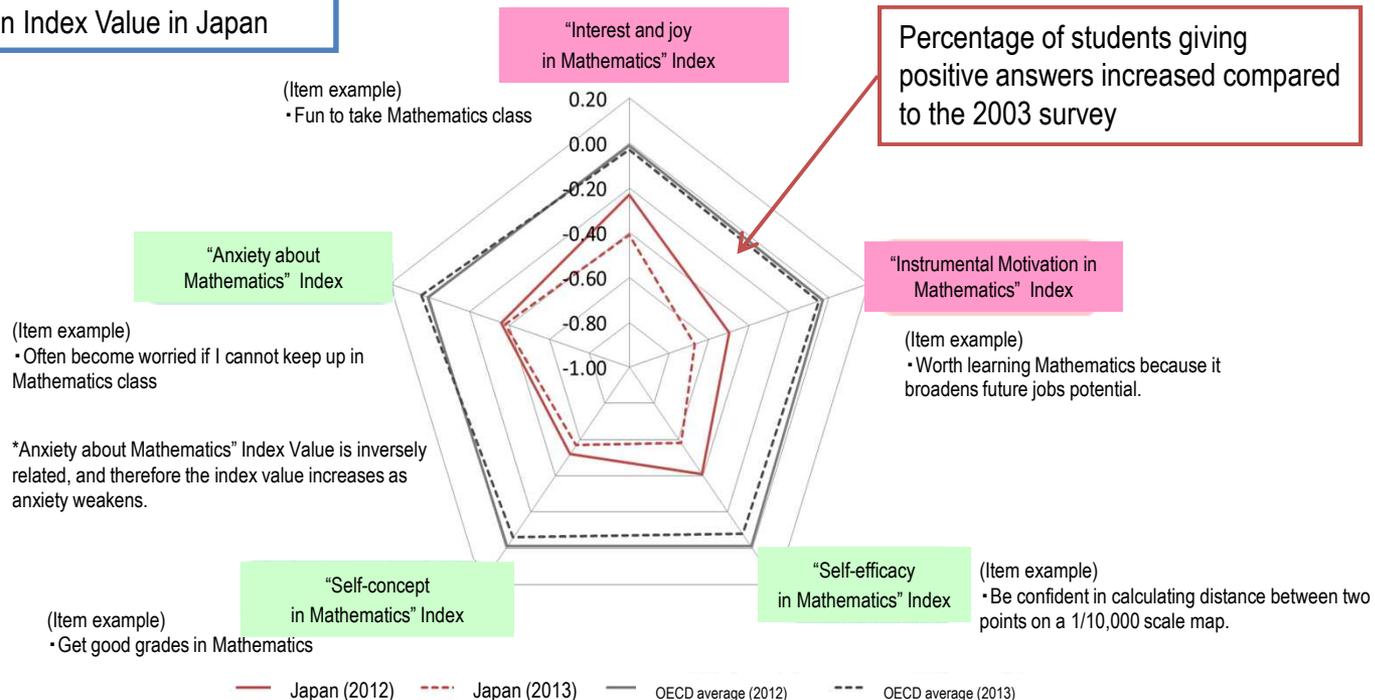
The new approach also led to revised textbook contents. The new curriculum reduced content by approximately 30%. For example, the number of English words to learn in junior high school was reduced from 1000 to 900. The aim was to promote self-observation, nurture the mind to think and learn, seek autonomous decision-making, and generate time to deepen study through activities that develop problem-solving skills. In 2007, the National Academic Achievement Test focusing on ability to utilize knowledge in a real-world context, began to be given to 6th and 9th grade students (3rd grade of junior high school).

4. Student Questionnaire (PISA2012)

Change in Learning Motivation Impacting Mathematical Literacy

- Five aspects surveyed through the student question sheet: “Interest and fun with Mathematics”, “Instrumental motivation in Mathematics”, “Self-efficacy in Mathematics”, “Self-concept in Mathematics”, and “Anxiety about Mathematics.”
- In Japan, “Self-concept in Mathematics” and “Anxiety about Mathematics” were at the same level as in 2003, but positive answers increased significantly in 3 indices, “Interest and fun in Mathematics”, “Instrumental motivation in Mathematics”, and “Self-efficacy in Mathematics”.

Change in Index Value in Japan



[Motivation]

① "Interest and Joy in Mathematics" Index *such as "like or dislike"

Question item 《Like reading books about Mathematics》 《Fun to take Mathematics class》
《Study Mathematics as I enjoy it》 《Interested in what I learn from Mathematics》

- Positive correlation between this Index and Mathematical Literacy in the 17 countries analyzed ⇒ Students who like and enjoy get higher scores.
- This tendency is relatively strong in Japan compared to other countries, but the average index is **negative**, and is followed by the Netherlands among the 17 countries.

② "Instrumental Motivation in Mathematics" Index *such as "to believe it's useful"

Question item 《Worth making an effort because it seems useful for a future job》
《Worth learning since it broadens future job potential》
《Why Math is important is that it's needed for what I now want to study》
《Want to learn a lot in Mathematics, and make use of it when I get a job》

- Positive correlation in 16/17 countries (excluding Singapore) ⇒ Students who feel Mathematics is useful for getting higher scores.
- This tendency is relatively strong in Japan compared to other countries, but the average Index is **the lowest** among the 17 countries.

⇒ Since **being strongly motivated** opens Math-related career options and opportunities in life, these aspects are also important.

[3 Indices Pertaining to Self-conviction]

① "Self-efficacy in Mathematics"

Question item 《If you have the confidence to solve a question like...?》

Ex. When a TV is discounted 30%, how much cheaper is it from the original price? / Can you calculate the fuel consumption for a vehicle?

- Students in the 17 countries who respond they have confidence get higher scores. This tendency is stronger in Japan.
- However, Japan shows the lowest positive responses among the 17 countries, such as 4 answers out of 8 questions.

② "Self-concept in Mathematics"

Question item 《How much does the following ... apply to you?》

Ex. Not good at Mathematics at all. / Have received good grades. / It is one of my favorite subjects.

- Students in the 17 countries who have confidence in their Mathematics ability get higher scores.
- Japan shows lowest positive answer among the 17 countries.

③ "Anxiety about Mathematics"

Question item 《How much does the following ... apply to you?》

Ex. – I become worried if I cannot keep up in Mathematics class at all. / feel very depressed when I do Mathematics homework.

- Students in the 17 countries who feel anxiety about Mathematics get lower scores.
- Japanese students' Anxiety Index is the highest among the 17 countries.

⇒ In the PISA result, students strongly believing in their own abilities, for example in countries such as Singapore, show good grades in Mathematics. **Enhancing motivation and interest** is worth referring to.

Study Environment at School

○As a result of the student survey with attached question sheet, Japan's "atmosphere in Mathematics class" is favorable.

- Answers indicating a favorable atmosphere in all items amount to over 80%.
- Compared to the 2003 survey, answers indicating a favorable atmosphere have increased significantly.

○As a result of the student survey with attached question sheet, Japan's "relationship between students and teachers" has improved in a positive way.

- Compared to the 2003 survey, answers indicating a favorable relationship between students and teachers have increased significantly.

Atmosphere in Mathematics Class

Relationship between Students and Teachers

*Percentage of students answering each question negatively.

* The greater the distance from the center, the more favorable the class atmosphere.

Students do not listen to what teachers say.

In 3 of 5 items, over 90% of answers indicate a favorable atmosphere, the highest among participating countries.

*Percentage of students who answered each question positively.

Students are getting along with most teachers.

Students do not start studying even after the class begins.

Students are noisy and do not behave properly during class .

Most teachers treat me fairly

Many teachers are interested in if students are happy with class.

Students are not so good at studying.

Teachers have to wait a long time until students become quiet.

Teachers help me if I need help .

Most teachers listen to what I say.

Compared to the 2003 survey, answers indicating a favorable atmosphere have increased significantly

Compared to the 2003 survey, answers indicating a favorable relationship have increased significantly.

— Japan (2012) - - - J Japan (2013) — OECD average (2012) - - - OECD average (2013)

— Japan (2012) - - - Japan (2013) — OECD average (2012) - - - OECD average (2013)

Study Environment at School

- The percentage of Japanese students who answered “attended kindergarten or nursery center for more than a year”, is the highest among all participating countries (65 countries and territories).
- In light of the status of Mathematical literacy scores, the average scores for students who answered “attended for more than a year”, are highest.

Study Environment Outside School

- In all 17 countries, students who have Higher household socio-economic and cultural status* obtain higher scores.
 - ※ Combination of 3 indices: “Parent’s/Guardian’s Occupation”, “Parent’s/Guardian’s Schooling History” and “Household Properties”
 - Differences in household socio-economic and cultural status among Japanese students is the smallest among the 17 countries.
 - Japan also guarantees relatively equal study opportunities, regardless of “student’s socio-economic and cultural background.”
- ⇒ Need to **be cautious of not widening education gaps.**

1. Relationship between Household Socio-economic Status and Academic Ability

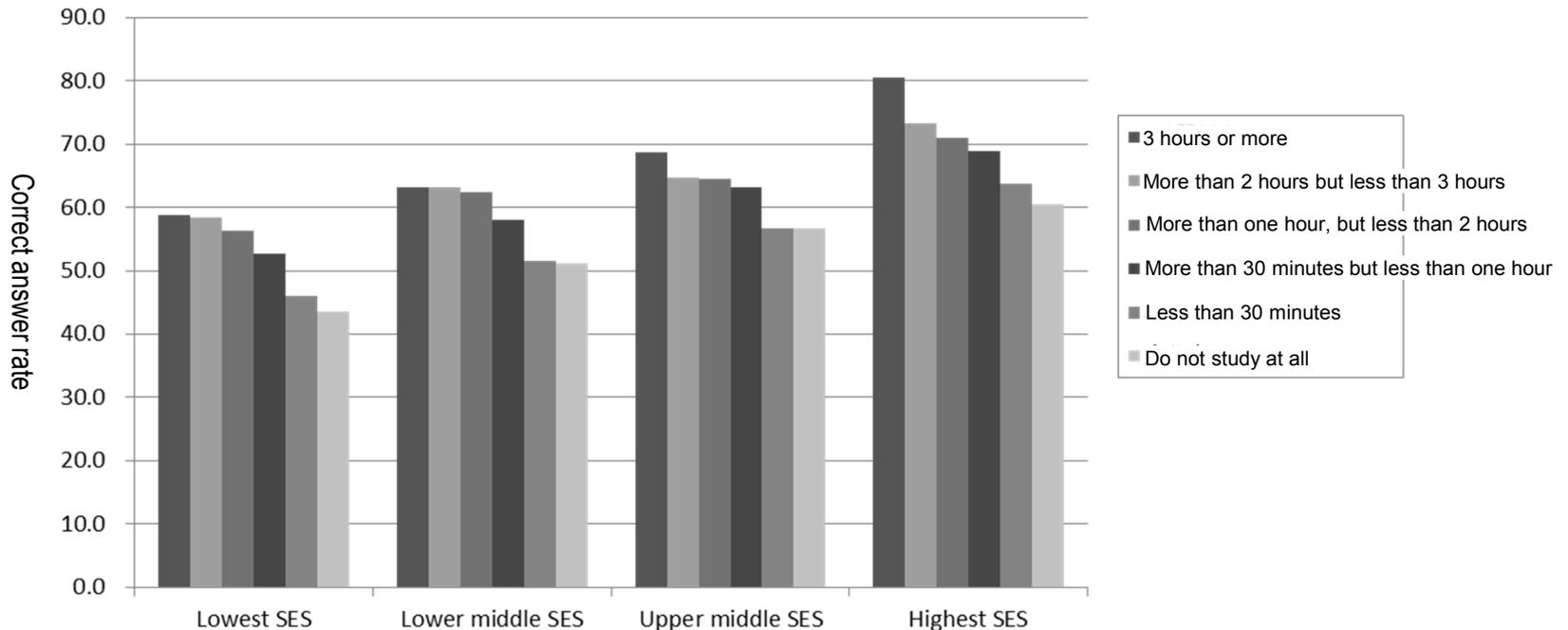
- Children with high household Socio-economic Status (SES), have a tendency to correctly answer a higher percentage of questions in each subject.

* Household Socio-economic Status (SES): Index used 3 variables; household income, father's academic background and mother's academic background - based on parent/guardian survey results. The index was divided into quarters, and was analyzed by sectioning the Highest SES, Upper-middle SES, Lower-middle SES, and Lowest SES.

	Elementary School				Junior High School			
	Japanese Language A	Japanese Language B	Arithmetic A	Arithmetic B	Japanese Language A	Japanese Language B	Mathematics A	Mathematics B
Lowest SES	53.9	39.9	68.6	47.7	70.7	59.8	54.4	31.5
Lower-middle SES	60.1	46.1	75.2	55.1	75.2	66.0	62.0	38.8
Upper-middle SES	63.9	51.4	79.2	60.3	78.6	70.3	67.5	44.9
Highest SES	72.7	60.0	85.4	70.3	83.6	76.7	75.5	55.4

2. Characteristics of Children who Overcome a Disadvantageous Environment

- Although there is a strong correlation between Household Socio-economic Status (SES) and the child's academic ability, low Household Socio-economic Status (SES), does not necessarily mean all those children are of low academic ability.
- A child's study time is linked with academic ability in the entire Household Socio-economic Status (SES), and study time is one of the measures that overcomes a disadvantageous environment.



Example of the relationship between amount of weekday study time and subject's average correct answer rate
(Elementary School/Japanese Language A)

5. Current Status and Issues among Japanese Teachers; in light of OECD's Teaching and Learning International Survey (TALIS 2013)

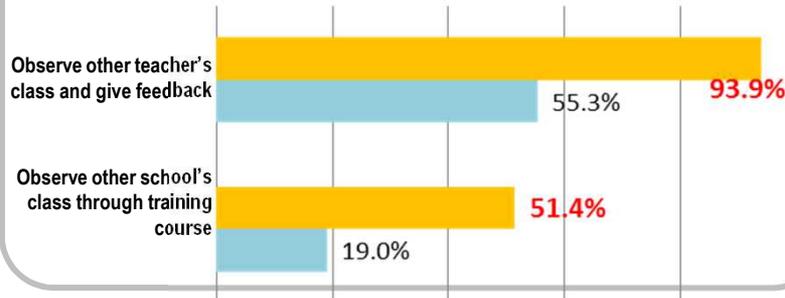
- 34 countries and territories participated in the OECD survey
- Questionnaire survey of approximately 200 **junior high school** principals and teachers (including part-time teachers) in Japan (national and public 90%, private 10%)



Through in-school training and class research, teachers regularly learn from each other, which leads to coaching improvement and increased motivation

- Japanese schools have traditionally practiced **in-school training** and **class research** wherein teachers learn from each other, and **a greater percentage receive support from an in-house trainer or get feedback from the principal or other teachers.**
- Japanese schools have a higher percentage of effort such as **class observation among teachers, self evaluation, and class questionnaires for students.**
- Effects of such efforts reflected in a higher percentage of teachers replying there is good impact on **coaching practice improvement or job satisfaction and motivation,** than the average among participating countries.

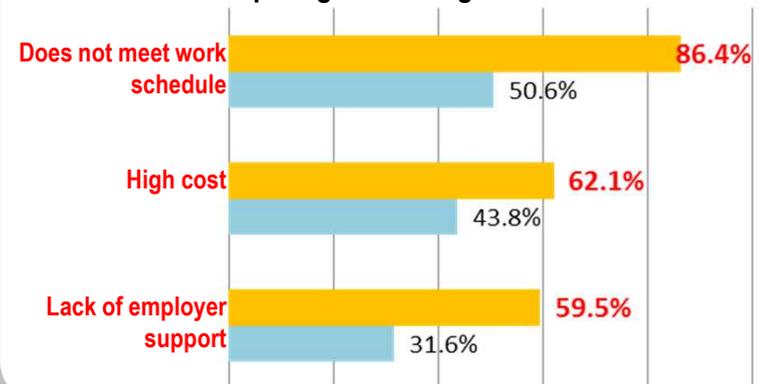
<Implementation Status of Class Observation>



Highly motivated to participate in training courses, but deterrents are being too busy with work, cost and lack of support.

- Percentage of Japanese teachers participating in introductory teacher's training is high, and **in-school training is actively** conducted.
- Despite **high training needs in Japan overall,** many teachers say their busy work schedule is an obstacle to participating, and that a **busy work schedule makes it difficult to participate.**

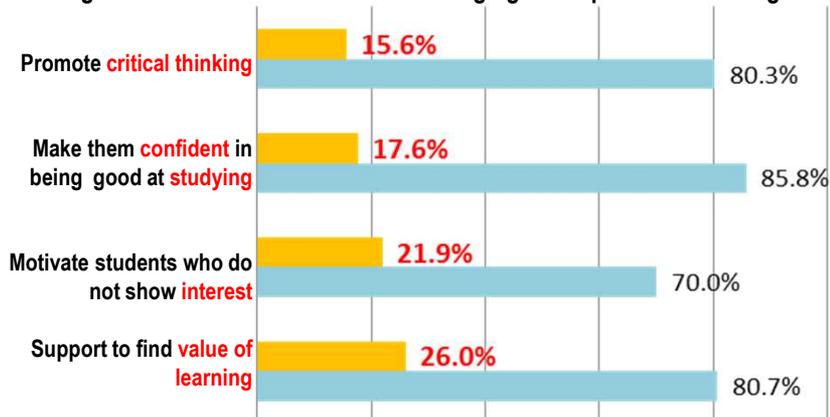
<Obstacle to Participating In Training Course>



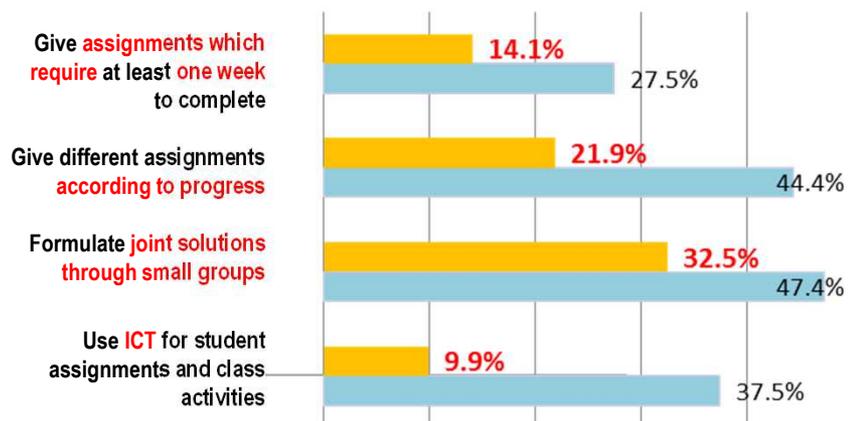


Teachers are less confident in **bringing about proactive learning**, and the percentage of teachers with **ICT utilization** is also **low**.

<Percentage of teachers with confidence in bringing about proactive learning>



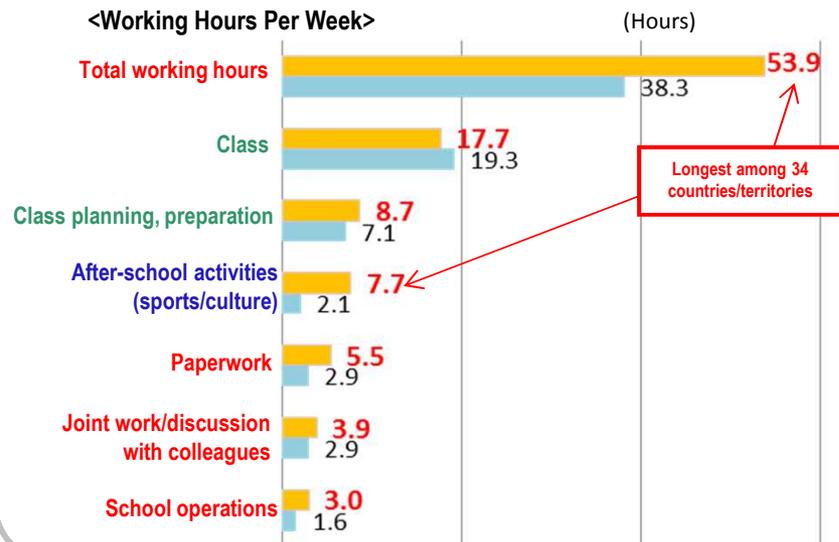
<Percentage of teachers who frequently conduct coaching practice>



Teachers' **working hours** are by far the **longest** among participating countries! Also, a **big sense of shortage of manpower**.

- Japanese teachers' weekly **working hours** are the longest.
- **Class hours** are at the same level of the **average** in participating countries, but coaching hours for **after-school activities (sports, cultural activities)** are particularly long, and the time teachers spend on **paperwork, class planning and preparation** is also long.
- Many principals highlight **a shortage of teachers and support staff**.

<Working Hours Per Week>



<Direction for Future Approach>

- ◆ Improve teacher quality through fundamental enhancement of recruitment, cultivation and training
- ◆ Promote education at which curriculum guidelines are targeted
- ◆ Strong promotion of education with ICT
- ◆ Need to enhance the teaching structure

6. Japan's Strengths and Future Issues Regarding Educational Policies

 1. Students, parents, educators, governments place importance on education ⇒ Use excellent teachers and tradition to support household education

 It is **difficult** to emphasize the importance on **investing in education** due to an aging society, natural disasters, etc.
⇒ Issues are to obtain a consensus that education is an **upfront investment in the future**, and **secure educational funding**

 2. Conviction that all students can attain a high level of education

*Do not divide based on career options at an early stage. **Make it difficult to create** economic and social **disparities**.
Encourage identifying every students' abilities.

*Japanese students believe “academic ability is determined by effort, rather than being inherited.”

 **High correlation** between **household socio-economic environments** and **each subject's academic performance**.
⇒ **Enhanced improvement of teaching methods & measures to narrow household socio-economic disparity** are important.

 Japan is a rare country that succeeded in increasing the percentage of students with high levels of academic achievement, but the **upper-rank segment is still small** compared to Shanghai, Singapore and Finland, etc. ⇒
Need to make efforts to **strike a balance between distinction and equality**.

 3. **Clear and Ambitious Educational Standard (Curriculum Guidelines)**

*Establish a structure to learn essential concepts in a systematic way according to progress of the academic year, by setting up high-level cognitive assignments.

*Simultaneously, standing on tradition by following a subject syllabus.

⇒ Need **curriculum reform** to convert the education process from a traditional approach based on subject, to an **approach based on competency**.

4. Effective Teaching Method and Gateway Entrance Exam

*Elaborate class planning with the purpose of having students thoroughly learn .

*Prepare **learning opportunities relevant to each individual**, in consideration of the differences among students. Focus on joint - learning and problem-solving type learning.

 Students do not have less **learning motivation, interest and confidence** than the OECD average.

 Due to the shrinking of the under 18 population, **learning incentive s through entrance exams is diminishing**.

⇒ Need to improve consciousness to **promote students' interest and motivation, and effective learning methods** through leveraging **experiences of integrated study**

5. High Quality Teachers (Refer to TALIS survey)

*Teachers' high social status and respect for teachers

*Focus on training to **strengthen their expertise** (Beginning teachers' training, 10-year training, license renewal courses)

*Promote teachers' self-reform, in order to continuously improve educational practices. ⇒ Tradition of **class research**

 Teachers' busy schedule. Spend considerable time on after-school activities and paperwork.

 Difficult to enhance training during financial retrenchment ,and shift to a general budget (particularly travel expenses)

⇒ Improve attractiveness of teaching as professional career (more attractive **salary** than other jobs, professional **autonomy**, cf. Finland)

⇒ Appropriate **personnel distribution**. (Tough principals for troubled schools, highly capable teachers for difficult classes). Arrange **various job categories**.

⇒ Effective teachers' **evaluations**

6. Balance between Centralization and Decentralization

*Do not leave financial administration to Municipal Governments or schools. Considerable discretion given to schools for curriculum policy creation and evaluation methods.

(Government leads financial administration; Prefectural Governments recruit teachers; Municipal Governments adopt textbooks; teachers' originality and ingenuity established through practice in class)

⇒ Rather than further changes in the roles of Central, Prefectural and Municipal Governments, let **Municipal Governments and schools** actively assume their own **responsibilities**. By doing so, focus on **prompt decision-making and independent actions**.

⇒ **Educational support based on opinions from on-site schools**