Science for Junior- high School Girls in Japan

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Highlights

- Today, I'd like to propose two things based on the concept of "self – fulfilling prophecy" from Robert K. Merton who is a sociologist.

1; Look at positive side, when we see the data about girls' attitude towards science.

2; Raise expectations and give more encouragement to girls to enhance the ratio of women scientists.

CONTENTS

1. General view on the girls' attitude towards science from previous research.
2. Different view on the girls' attitude towards science from the questioner research collected from junior-high school which I was involved with.
3. Considering the girls' attitude and the goal of 202030.

Why important to show Junior – high

- Junior high school is the last stage of compulsory education in Japan (JH1=7th). It means that science education in Junior-high is very important for providing basic knowledge for citizens and helping students choose their high school and university science course.

General view; international survey and domestic survey

- According to most international surveys, Japanese junior high school students tend to have a negative attitude toward science compared to other countries, especially girls. Despite this, both girls and boys are in the highest groups of science achievement.

-TIMSS 1995

Japanese girls have less Self-Confidence in learning science than boys.

The gender gap in students' dislike for learning science was the largest among the participant countries where science is not taught as a specialization.

-PISA2006

A feature of Japan is the large gender differentiation in attitudes toward learning science.

- According to some domestic surveys, the ratio of girls who like science in junior- high is obviously lower than boys, and the gap between girls and boys is increasing compared to their pupils in elementary school.

-2001(National Institute for Educational Policy Research)

The gender gap of students who like science is 10 points in the elementary school, but 19 points in junior-high.

-2006 (Benesse Educational Research and Development Center)

There are less girls who like science in Junior-high than boys (girls;43% / boys;63%).

The gender gap of students who like science in junior –high (20p) is greater than the gap between pupils.

Findings of previous surveys

- Girls have a more negative attitude toward science than boys.
- Girls negative attitude in Junior –High is getting worse than in their elementary schools.

- Based on these findings, the reason why few girls major in science courses is their negative attitude toward science.
- This conclusion is right, but it seems to be only one sided. We could notice other points, if we can grasp the details of girl's interests and attitudes towards science. I will show you on the next slides using the collaboration research which I was involved with.

About the research

- I would like to focus on the data of a questioner survey to grasp the actual condition of science learning collected from junior high school students.
- This questioner survey conducted by the collaboration research group on “gender and education” belongs to the International Society for Gender Studies.
- The survey has two unique points.

- High reliability; The National Junior High School Science Educational Research Association collected samples at random from all areas of Japan.
- Measuring the change from first year to second year in Junior-high; These samples are from the same school students, 1999 was the 1st year and 2000 was the 2nd year.

- I would like to show you the essence of the result of our research.

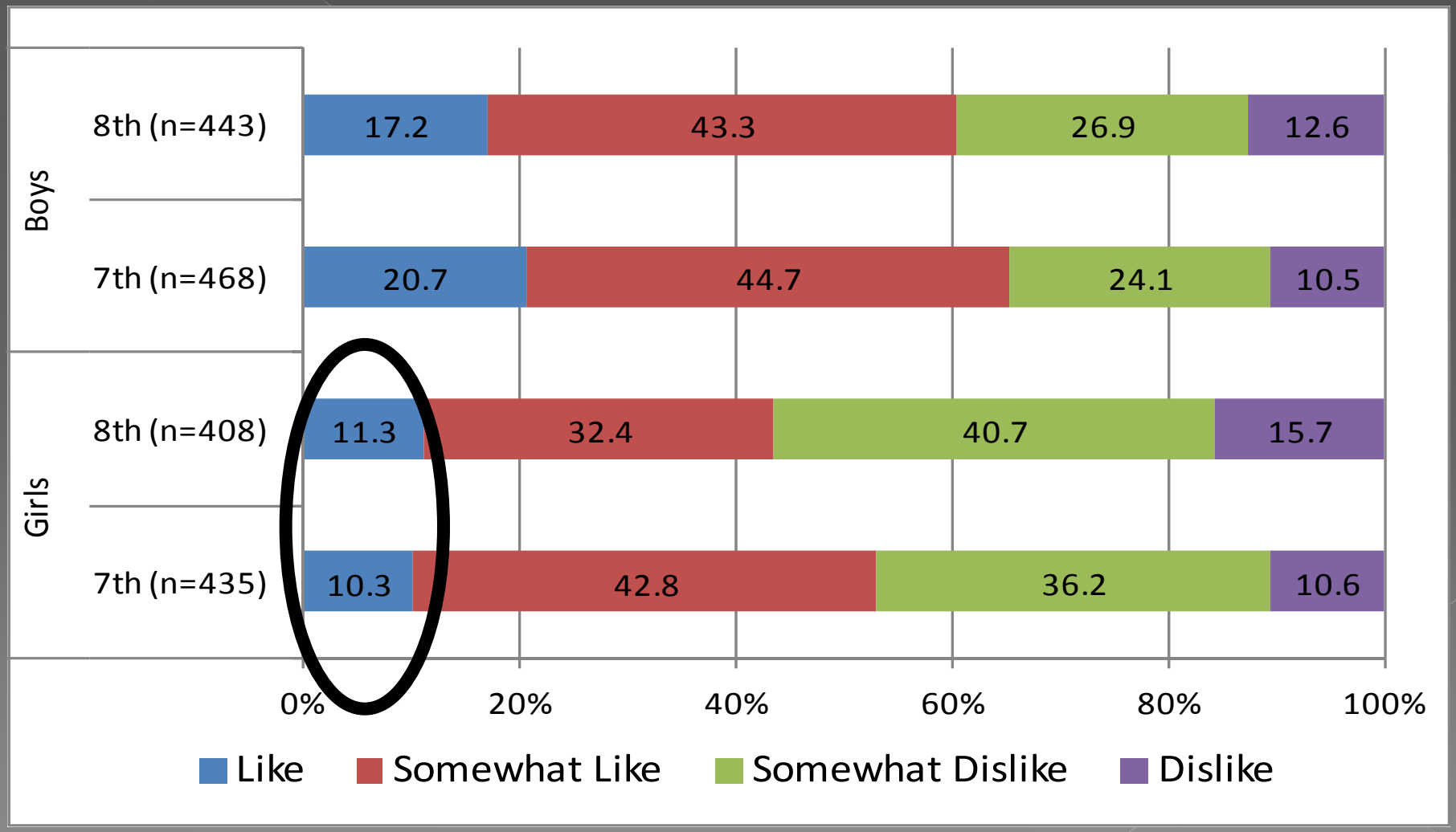
1. Details of like/dislike for science
2. Valuing of learning science
3. Changing of interest towards science

1.Details of liking for science; compare to other subjects

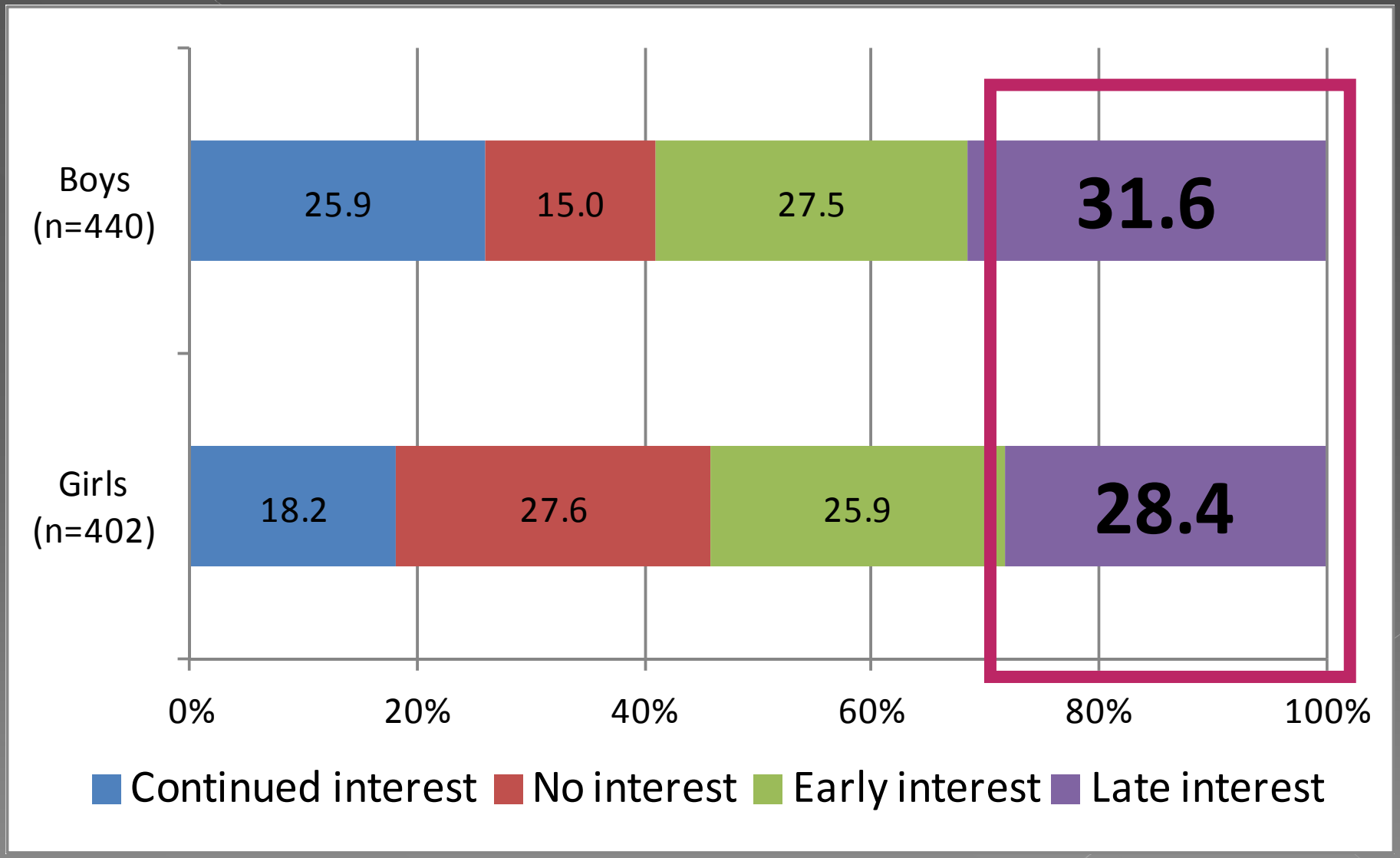
Table 1 Favorite subjects in 7th grade

	N	Eng lish	Math	Japa- nese	Sci- ence	Social science	P.E.	Arts	Music	Techno- logy & Home- making
Girls	435	48.6	38.8	26.1	29.6	29.6	51.4	46.8	72.5	41.7
Boys	468	35.9	56.6	19.4	41.6	45.8	77.1	39.2	32.7	44.2

Details of liking for science; A trend from 7th to 8th grade



Change of interest in science



Value of learning science

			7th		8th	
a.	Interested to solve a riddle or discover wonder of nature.	Girls	65.7		53.8	
		Boys	64.9	n.s.	55.2	n.s.
b.	Knowing about the mechanism of natural phenomenon is important.	Girls	57.7		46.2	
		Boys	55.9	n.s.	45.9	n.s.
c.	An entrance examination requires Science.	Girls	55.8		41.0	
		Boys	62.9	*	44.8	n.s.
d.	Science is useful for everyday life.	Girls	29.2		18.8	
		Boys	28.3	n.s.	22.3	n.s.
e.	Science is useful for future family life.	Girls	25.7		11.6	
		Boys	25.9	n.s.	10.2	n.s.
f.	Science is useful for future employment.	Girls	21.3		9.1	
		Boys	31.8	***	15.5	**
g.	Studying science is meaningless.	Girls	10.0		16.3	
		Boys	10.3	n.s.	13.6	n.s.
		*p<.05, **<p,.01, ***p<.001				

Value of learning science for girls; continued interest / late interest

		Continued interest		Late interest
a.	Interested to solve a riddle or discover wonder of nature.	84.9	>	65.8
b.	Knowing about the mechanism of natural phenomenon is important.	54.8	>	51.8
c.	An entrance examination requires Science.	37.0	>	35.1
d.	Science is useful for everyday life.	30.1	>	22.8
e.	Science is useful for future family life.	13.7	<	19.3
f.	Science is useful for future employment.	12.3	>	11.4
g.	Studying science is meaningless.	6.8	>	5.3

*8th grades girls

Expectations of teachers and parents in the 8th grade

		Very much	A little	Less	Not at all	
My teacher expects me to perfom well in Science.	Girls	1.1	5.4	51.1	42.3	
	Boys	5.3	13.2	48.3	33.2	***
I think my mother will be happy if in the future I am able to find job related to science and/or technology.	Girls	4.6	10.8	41.6	43.0	
	Boys	10.1	18.8	39.5	31.6	***
I think my father will be happy if in the future I am able to find job related to science and/or technology.	Girls	7.2	13.5	37.5	41.8	
	Boys	9.9	21.5	37.1	31.5	***
			*p<.5, **p<.01, ****p<.001			

202030

- “202030” is the goal of gender equity policy in the Japanese government set in 2003, the ratio of women leaders will be increased to 30% in all fields by the year of 2020. Scientist is defined as one of them.
- In fact I was talking about junior-high school girls in 1999 and 2000. This generation of students are now taking doctoral courses in 2011. Women student ratio in 2011 is the following; science 17%, engineering 16%, agriculture 34%, health 33%. The average ratio of natural science has not reached the 30% goal. It is clear that increasing the number of girls who major in science related areas is vitally important to promote the women scientist ratio.

- In my opinion, if people around girls did not fall into the trap of believing the myth about girls and science, the women ratio in 2011 would be enhanced.
- In conclusion I should like to say again that to look at the positive side, to raise the expectations and give more encouragement to girls, is needed to stop the "self-fulfilling prophecy".
- I would be interested to learn about the situation in Korea and Taiwan.

Thank you