



# Science and Mathematics Education Research Project

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&

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*Draft, do not use it as reference yet*



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## Introduction & Background

- *5 countries initially involved*

Singapore (Dr Lionel Pereira Mendoza/Team leader)

China (Dr Li Jun)

South Korea (Dr Hai Ae-Seo)

Thailand (Dr Pisarn & Dr Vantipa Roadrangka)

United States of America (Dr Hai Lung Dai)



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## Introduction & Background

- *Project Outline*

Purpose of project:

Compare the educational practices and experiences of different countries and to learn from one another



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## Introduction & Background

- *Project Outline*

Questionnaires initially developed to collect data from 3 sources:

Secondary students

Teachers

Teacher Educators/Trainers



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## Introduction & Background

- *Project Outline*

Questionnaires to focus on:

attitudes, perceptions and similar attributes  
on science and mathematics and related  
educational practices *instead of*  
*achievement*



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## Project Update

Following data received:

- Singapore science and mathematics student data
- South Korea science student data
- Thailand science student data



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## Report on Present Preliminary Study

- *Some Limitations*

Student science data from 3 countries (Singapore, South Korea and Thailand) and mathematics data from Singapore only.

In this presentation, I will only report on certain aspects of perceptions and attitudes of students.



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Report on Present Preliminary Study

- *Sampling*

Singapore

Express, Normal Academic, Normal Technical  
streams

More than 3000 science students

More than 3000 mathematics students



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Report on Present Preliminary Study

- *Sampling*

South Korea

Urban, Suburban and Rural students

Nearly 7000 science students



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Report on Present Preliminary Study

- *Sampling*

Thailand

Urban, Suburban and Rural students

More than 1400 science students



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## Report on Present Preliminary Study

- *Attitudes and Perceptions*

### Use of English at Home

Since English is the medium of instruction in the Singapore context, data on its use in the different streams important.



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Report on Present Preliminary Study

- *Attitudes and Perceptions*

Use of English at Home

a minority of students at all levels never speak English at home (about 10%)



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## Report on Present Preliminary Study

- *Attitudes and Perceptions*

### Use of English at Home

English always/almost always is greatest for the Express stream and lowest for the Normal Technical stream, suggesting that proficiency in English may help students perform better in science and mathematics.



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## Report on Present Preliminary Study

- *Attitudes and Perceptions*

### Use of English at Home

In general the use of English at home increases from secondary 1 through secondary 4.



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## Report on Present Preliminary Study

- *Attitudes and Perceptions*

### Importance of science and mathematics

Students were asked how important it was to do well in mathematics and science as perceived by their mother, father, friends and themselves.

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The table below summarised the percentages perceiving the importance of science and mathematics across all 3 countries.

	S'pore Science	S'pore Maths	S. Korea Science	Thailand Science
Mother	96%	96%	90%	94%
Father	95%	97%	85%	94%
Friends	91%	92%	87%	93%
Themselves	97%	98%	89%	94%



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## Importance of science

Table below summarised the statistical significance across the 3 countries ( $p=0.05$  level)

Mother	S'pore > Thailand > S. Korea
Father	S'pore > Thailand > S. Korea
Friends	(S'pore & Thailand) > S. Korea
Student	S'pore > Thailand > S. Korea



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## Importance of science and mathematics

In general a high percentage of students perceived the importance of doing well in science and mathematics across all the countries. They perceived that their parents and peers have similar beliefs.



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## Importance of science and mathematics

The data also indicated that among the 3 countries a lower percentage of the South Korean students, their parents and their peers perceived the importance of science.

Initial discussions with South Korean colleagues appeared to confirm the decline of science. In the case of Singapore and Thailand this is not the case.



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## Importance of science and mathematics

Across all 3 countries, the gap in perception among the students, their parents and peers is less than 6%. This indicated a very consistent societal perception.

In earlier TIMSS results, it was reported that this gap was 10 to 20% for mathematics and 20 to 30% for science.



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## Report on Present Preliminary Study

- *Attitudes and Perceptions*

### Importance of sports

Students were asked how important it was to do well in sports as perceived by their mother, father, friends and themselves.

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The table below summarised the percentages perceiving the importance of sports across all 3 countries.

	S'pore Science	S'pore Maths	S. Korea Science	Thailand Science
Mother	78%	76%	75%	80%
Father	84%	83%	75%	83%
Friends	85%	92%	80%	82%
Themselves	89%	86%	82%	83%



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## Importance of sports

Table below summarised the statistical significance across the 3 countries ( $p=0.05$  level)

Mother	S. Korea > S'pore
Father	(S'pore & Thailand) > S. Korea
Friends	S'pore > (Thailand & S. Korea)
Student	S'pore > (Thailand & S. Korea)



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## Importance of sports

The percentages were still very high (in excess of 80%) but always lower than the importance of doing well in science and mathematics.

For the Singapore and South Korean data, the parents tend to place less importance on “doing well in sports” compared to that of friends and respondents themselves.



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## Report on Present Preliminary Study

- *Attitudes and Perceptions*

### Why need to do well in science and mathematics

Students were asked why they need to do well in science and mathematics with respect to 4 reasons provided.

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The table below summarised the percentages across all 3 countries.

	S'pore Science	S'pore Maths	S. Korea Science	Thailand Science
"get job"	68%	80%	70%	93%
"please parents"	65%	69%	84%	91%
"continue education"	93%	95%	64%	98%
"please myself"	81%	83%	79%	95%



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## Why need to do well in science

Table below summarised the statistical significance across the 3 countries ( $p=0.05$  level)

"get job"	Thailand > S. Korea > S'pore
"please parents"	(Thailand & S. Korea) > S'pore
"continue education"	Thailand > S'pore > S. Korea
"please myself"	Thailand > (S'pore & S. Korea)



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## Why need to do well in science and mathematics

For Singapore, students valued “continue my education” very highly while “please my parents” was valued lowest.

Perhaps this is not surprising since they have to do well in science and mathematics in order to “continue their education”.



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## Why need to do well in science and mathematics

In contrast, South Korean students valued “please my parents” higher while “continue my education” was valued lowest.

This will be consistent with the reality that opportunities to “continue their education” is not dependent on doing well in science and mathematics.



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Why need to do well in science and mathematics

For the Thai students, all the reasons are valued equally high.



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## Report on Present Preliminary Study

- *Attitudes and Perceptions*

What were needed in order to do well in science and mathematics

Students were asked what were needed in order to do well in science and mathematics with respect to 4 aspects provided.

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The table below summarised the percentages across all 3 countries.

	S'pore Science	S'pore Maths	S. Korea Science	Thailand Science
"natural ability"	70%	69%	61%	89%
"good luck"	46%	50%	41%	47%
"hard work"	94%	95%	93%	69%
"pay attention"	97%	97%	98%	99%



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What were needed in order to do well in science

Table below summarised the statistical significance across the 3 countries (p=0.05 level)

"natural ability"	Thailand > S'pore > S. Korea
"good luck"	(Thailand & S'pore) > S. Korea
"hard work"	S'pore > S. Korea > Thailand
"pay attention"	(Thailand & S. Korea) > S'pore



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What were needed in order to do well in science and mathematics

Across all the 3 countries, all the students agreed that “pay attention in class” was necessary.

While students in Singapore and South Korea saw the need for “hard work”, the Thai students did not. Instead they saw “natural ability” as more important.



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## Report on Present Preliminary Study

- *Attitudes and Perceptions*

### Time spent beyond normal school hours

Students were asked how they spent their time out of their normal school hours in a normal week and day.

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The table below summarised the data across all 3 countries.

	S'pore	South Korea	Thailand
"extra science lessons in school"	61%	26%	55%
"private science tuition"	32%	47%	45%
"study or do science homework"	87%	80%	94%



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## Time spent beyond normal school hours

Table below summarised the statistical significance across the 3 countries (p=0.05 level)

"extra science lessons in school"	(S'pore & Thailand) > S. Korea
"private science tuition"	S. Korea > Thailand > S'pore
"study or do science homework"	Thailand > S'pore > S. Korea



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## Time spent beyond normal school hours

Across all the 3 countries, a high percentage of students do spend time studying or doing their science homework.

While more than 50% of students in Singapore and Thailand had at least taken extra science lessons in school beyond their normal curriculum hours in a given week, only 26% of students in South Korea did so.



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## Concluding Remarks

For a more complete report, we will continue to analyse the available data. In particular, a deeper look at the following:

- Attitude towards science, nature of science & scientists
- Classroom practices (teacher-student centredness, deep-surface processing)



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## Concluding Remarks

- Use of textbooks & other resources
- Homework practices
- Assessment practices



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## Concluding Remarks

We will seek a closer collaboration with the participating countries to discuss issues and trends resulting from the study.



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Thank you for your patience!