Policy Making with IEA Report

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National Taiwan Normal University

Plenary Keynote Speech at The 3rd IEA IRC, 16-20, Sep., 2008, Taipei, Taiwan
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Ⅱ. Action Plans w.r.t. the Policy

Formal Action

- **NSC**: Call for proposals in year 2004/2005

Informal Action

Ⅲ. Making A Policy Efficient:
   The Five Necessary Elements

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“Find a right person to do the right thing”
I . A Policy Making with IEA Report in Taiwan

About

• **Low Achiever**
• **Learning Interest**
• **Self-efficacy**
Distribution of Mathematics Achievement

TIMSS-2003 Grade 8

Mathematics Achievement Distribution

SG
KR
HK
TW
JP
BE
NL

International Avg.

×100

1  2  3  4  5  6  7  8

BW  SA  GH  ZA  England

Botswana  Saudi Arabia  Ghana  South Africa

(IEA, 2004)
Distribution of Mathematics Achievement

TIMSS-2003 Grade 4

Mathematics Achievement Distribution

SG
HK
JP
TW
BE
NL

×100

1
2
3
4
5
6
7
8

International Avg.

PH
MA
TN

(Flemish)

Morocco
Tunisia

IEA, 2004
<table>
<thead>
<tr>
<th>Countries</th>
<th>(Advanced)</th>
<th>(High)</th>
<th>(Intermediate)</th>
<th>(Low)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singapore</td>
<td>44</td>
<td>77</td>
<td><strong>93</strong></td>
<td>99</td>
</tr>
<tr>
<td>Taiwan</td>
<td>38</td>
<td>66</td>
<td><strong>85</strong></td>
<td>96</td>
</tr>
<tr>
<td>Korea</td>
<td>35</td>
<td>70</td>
<td><strong>90</strong></td>
<td>98</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>31</td>
<td>73</td>
<td><strong>93</strong></td>
<td>98</td>
</tr>
<tr>
<td>Japan</td>
<td>24</td>
<td>62</td>
<td><strong>88</strong></td>
<td>98</td>
</tr>
</tbody>
</table>

% of students reaching TIMSS 2003 International Benchmark

(IEA, 2004)
### % of students reaching TIMSS 2003 International Benchmark

<table>
<thead>
<tr>
<th>Countries</th>
<th>International Benchmark</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Advanced)</td>
</tr>
<tr>
<td></td>
<td>625</td>
</tr>
<tr>
<td>Singapore</td>
<td>38</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>22</td>
</tr>
<tr>
<td>Japan</td>
<td>21</td>
</tr>
<tr>
<td>Taiwan</td>
<td>16</td>
</tr>
</tbody>
</table>

*(IEA, 2004)*

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A local definition of Low Achievers

Students who are not reaching TIMSS intermediate benchmark, e.g., 8% of grade 4; 15% of grade 8, in Taiwan.
Low Achievers

Why the % of low achievers showed a “quantum jump” from grade 4 to 8 in Taiwan?
### Proposal for Ministry of Education and National Science Council Business Coordination Meeting (First Meeting, 2006)

#### Item

<table>
<thead>
<tr>
<th>Background</th>
<th>Proposer</th>
</tr>
</thead>
<tbody>
<tr>
<td>如何制定教育政策以落实『待好每位學生』的教育理念，并提升我国中小学学生数理科的学习兴趣及信心，提请讨论。</td>
<td>教育部国立教科、国科会科教处</td>
</tr>
</tbody>
</table>

#### 説明

一、由部会共同参与由 IEA 主辨的「国际数学与科学教育成就趋势调查(TIMSS 2003)」，经初步分析来看，有三个值得注意的现象：
1. 在四十九个参与调研的国家中，我国国二和小四学生的科学平均成绩排名都是第二，国二和小四学生的数学总平均成绩排名都是第四，表现极为优异。
2. 以领先群的五个国家来看，我国国中二年级数学的低成就群〈47分以下〉人数占15%，高于各领先群国家甚多。(详表一)
3. 对于数理的学理兴趣及自信心指標，领先群的五个国家普通低於国际平均，与第一名的新加坡相較，我国学生数理的兴趣及自信心又更低(详表三)

二、为提升我国中小學生数理素质及學習興趣，建议将下列两点列为施政目标，并以下一次的 TIMSS(2011年)施测成绩为绩效查核指標：
1. 在『待好每位学生』的教育理念下，于六年內将低成就群的孩子由15%减至10%以内。
2. 提升学生对数理学习兴趣，将『非常同意』及『有点同意』喜欢数学的百分率提高在国际平均(60%)以上。

#### 擬辦

<table>
<thead>
<tr>
<th>案由</th>
<th>提案单位</th>
</tr>
</thead>
<tbody>
<tr>
<td>由部会共同参与由 IEA 主辨的「国际数学与科学教育成就趋势调查(TIMSS 2003)」，经初步分析来看，有三个值得注意的现象：</td>
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How to formulate education policies to put the education vision, “take care of every student so that each child gets progress”, into practice and to enhance elementary and secondary school students’ interests and confidences toward mathematics and science? Please discuss on this issue.
Background 1 - phenomena

1. Reports of TIMSS-2003 (conducted by IEA) reveal three phenomena that need to be noticed:

a) Our students performed well among the 49 participated nations. The average science scores of our eighth-grade and fourth-grade students rank number two; the average mathematics scores of our eighth-grade and fourth-grade students rank number four.
b) Among the five leading nations in TIMSS-2003 reports, our eighth-grade low-achievers are about 15% among all (score below 475), which exceeds the rest of leading nations. (Table 1)

Table 1. The assessment of leading groups’ eighth-grade students’ performance in mathematics
Background 1 - phenomena

c) For the index of interests and confidences in mathematics and science learning, the leading five nations’ average is generally lower than the international average. Compare to Singapore (rank number one), our students’ index of interests and confidences in mathematics and science learning is lower. (Table 2)

Table 2. Confidence of leading groups’ eighth-grade students

<table>
<thead>
<tr>
<th></th>
<th>I like mathematics (Interest toward mathematics)</th>
<th>Mark for confidence of learning mathematics (My mathematics is good)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Totally agree</td>
<td>Somewhat agree</td>
</tr>
<tr>
<td>Singapore</td>
<td>33</td>
<td>42</td>
</tr>
<tr>
<td>Korea</td>
<td>9</td>
<td>34</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>15</td>
<td>45</td>
</tr>
<tr>
<td>Taiwan</td>
<td>13</td>
<td>29</td>
</tr>
<tr>
<td>Japan</td>
<td>9</td>
<td>30</td>
</tr>
<tr>
<td>International Average</td>
<td>29</td>
<td>36</td>
</tr>
</tbody>
</table>
2. In order to enhance our students’ mathematics and science competences and their learning interests, the following two proposals are suggested to become the goals of education policies, and the result of next TIMSS (2011) would be used as checking index:
a) Under the education vision, “take care of every student so that each child gets progress”; the group of low-achievers would be reduced from 15% to 10% and below. (Base on reports of TIMSS-2011)

Decision: Agree
b) Enhance students’ mathematics and science learning interests. Raise the percentage of mathematics liking of “totally agree” and “somewhat agree” to exceed the international average (65%).

**Decision:** ↓to 60%
II. Action Plans w.r.t. the Policy

Formal Actions

MOE
NSC
### Collaboration Plan - After Class Support (2006)

<table>
<thead>
<tr>
<th>Academic Year</th>
<th>Subject (Students’ class achievement)</th>
<th>Discipline</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>• Urban: &lt;5 percentile&lt;br&gt;• Rural: &lt;25 percentile</td>
<td>Mandarin, English, Maths</td>
</tr>
<tr>
<td>2008</td>
<td>• Urban: &lt;15 percentile&lt;br&gt;• Rural: &lt;25 percentile</td>
<td>Mandarin, English, Maths, Science, Social Studies</td>
</tr>
<tr>
<td>2009</td>
<td>• Urban: &lt;20 percentile&lt;br&gt;• Rural: &lt;35 percentile</td>
<td>Mandarin, English, Maths, Science, Social Studies</td>
</tr>
</tbody>
</table>
MOE’s 2007 Collaboration Plan - After Class Support, United Evening News, 26th, Aug., 2008

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Results (MOE)

The linkage of the efficient cases in After Class Support project:

http://140.133.2.35
Ⅱ. Action Plans w.r.t. the Policy – case 1 (formal)

Results (MOE)

1. Before participating in the after-class support, 90% of participants never do their home work; after one year, all of them could finish their home work.

2. 80% of participants have developed more positive learning attitudes than before.

3. 60% of participants have progress on their school exams.

(MOE, 2008)
Special call for proposals, 2004

Program Application for “Profound studies with International Students Assessment” (2004/09/08)

In order to deal with domestic education problems (such as education policies, curriculum development, teaching approaches, learning environment, belief and value about education and so on), researchers are encouraged to do profound studies based on international students assessment held by for example, IEA and OECD. Researchers who are interested in the program are welcome to bring individual or integrated projects.
## II. Action Plans w.r.t. the Policy — case 2 (formal)

### Results (Proposals funded by NSC in 2005)

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chih-Chien Yang</td>
<td>Mathematics and Reading Progress of Taiwan in TIMSS &amp; PIRLS (1/3)</td>
</tr>
<tr>
<td>Fang-Ying Yang</td>
<td>Exploring the epistemic, metacognitive and the affective levels of teacher/student cognition and the styles of teaching and learning in the social and cultural context</td>
</tr>
<tr>
<td>Min-Ning Yu</td>
<td>Study of the international comparison of factors affecting mathematics achievement - The comparison of TIMSS 2003, PISA 2003, and TEPS databases used as an example</td>
</tr>
<tr>
<td>Mei-Shui Chiu</td>
<td>Students’ TIMSS achievements on different problem types and their interactions with gender, affective responses and learning contexts (1/2)</td>
</tr>
<tr>
<td>Hak-Ping Tam</td>
<td>Data analysis of the TIMSS 2003 study (1/2)</td>
</tr>
<tr>
<td>Fang-Chung Chang</td>
<td>Research on Academic Achievement Impacted by Economic and Educational Factors: The TIMSS Data Bank in 1995, 1999, and 2003 Years Study</td>
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Ⅱ. Action Plans w.r.t. the Policy – case 2 (formal)

Regular annual call for proposals, 2005

Invitation of Science and Mathematics Education Research Projects by Department of Science Education, NSC (2005/09/20)

- Longitudinal assessment of elementary and secondary school students’ science and mathematics competence and the comparison of international students assessment.
- Longitudinal assessment on elementary and secondary school students’ mathematics literacy and the comparison of international students assessment.

Educators are encouraged to do regular (annually, bi-annually) or longitudinal assessment and profound analysis toward domestic elementary and secondary school students’ mathematics competence and basic abilities. Educators are also encouraged to explore the related variables of enhancing mathematics competences.
### Results (Proposals funded by NSC after 2006)

<table>
<thead>
<tr>
<th>Mei-Yu Chang</th>
<th>The Understanding of TIMSS Test Question, the Process of Answering the Question, and Science Achievement in Grade 4 students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fang-Chung Chang</td>
<td>Testing the Correlation Between Student's Achievement and Their Mathematical Belief: Using the TIMSS2003 Data to Explore Fourth and Eight Graders</td>
</tr>
<tr>
<td>Mei-Yu Chang</td>
<td>The relationship between science curriculum and self-confidence, interest, achievement of students in elementary science learning</td>
</tr>
<tr>
<td>Min-Ning Yu</td>
<td>The way toward a female scientist---An exploratory study from the TIMSS data analysis</td>
</tr>
<tr>
<td>Hak-Ping Tam</td>
<td>Data analysis of the TIMSS 2003 study (2/2)</td>
</tr>
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<td>Mei-Shui Chiu</td>
<td>Students’ TIMSS achievements on different problem types and their interactions with gender, affective responses and learning contexts (2/2)</td>
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<td>Min-Hsiung Huang</td>
<td>International Comparisons of the Variability of Student Performance within and Between Classroom: fourth and Eight Grade Student in the TIMSS2003</td>
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<tr>
<td>Chien-Shu Chang</td>
<td>The Research for Mathematics and Reading Performance of Fourth Graders in TIMSS2003 and PIRLS2006 field Test</td>
</tr>
<tr>
<td>Miao-Hsiang Lin</td>
<td>Statistical Methods for Analyzing Contextual Perspectives for the TIMSS 2003 International Database</td>
</tr>
</tbody>
</table>
II. Action Plans w.r.t. the Policy

**Informal Actions**

Invited Speeches on

- Learning characteristics
- Comparison
- Practice scheme
<table>
<thead>
<tr>
<th>Date</th>
<th>Title of Speech</th>
<th>Audience</th>
<th>Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 16, 2007</td>
<td>The world cup of education – The distances from Taiwan to</td>
<td>School principles &amp; citizens who care about education</td>
<td>Tayih Landis Hotels and Resorts, Tainan</td>
</tr>
<tr>
<td></td>
<td>the world</td>
<td></td>
<td>(hosted by Common Wealth Magazine &amp; Taiwan Microsoft)</td>
</tr>
<tr>
<td>May 31, 2007</td>
<td>The dream and practice of Taiwan high quality senior</td>
<td>Principles of senior high schools in Southern Taiwan</td>
<td>National PingTung University of Education</td>
</tr>
<tr>
<td></td>
<td>high school education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aug. 23, 2007</td>
<td>A practice scheme for Taiwan high quality education</td>
<td>School principles and dean of study in Hsinchu City</td>
<td>Hsinchu Municipal Nan-Liao Primary School</td>
</tr>
<tr>
<td>Apr. 25, 2008</td>
<td>A practice scheme for Taiwan high quality education</td>
<td>School dean of study in Kaohsiung city</td>
<td>Kaohsiung Municipal Fwu-Shan Junior High School</td>
</tr>
</tbody>
</table>
Ⅲ. Making A Policy Efficient -
the five necessary elements

• Initiators of policy
• Goals of policy
• Indicators of achieving the goals
• Executors of action plans
• Annual progress assessment
IEA are implicit initiators of policy

Different societal education phenomena can be revealed and identified with IEA reports. The identified phenomenon then is like a starter of an engine for education reform policy.
The Taiwanese policy for supporting lower achievers are heavily relied on TIMSS-2003 and TIMSS-2011 for its goals and indicators of achieving the goals.
Executors of Action Plans

- Researchers (NSC)
- University educators (MOE)
- Available tutors
Available Tutors in Taiwan -1

- **Stray Teacher**
  The supply of prospective teachers exceeds the demand

E.g., in year 2006, there are 72 universities/colleges with teacher education program, 17,000 certified school teachers graduated. Among them, 4,000 are selected as regular teacher. More than 10,000 are “Stray Teacher”. Many of stray teachers make contribution to after-class support program.
Available Tutors in Taiwan -2

- Retired Teacher
- Qualified College Student (part-time)
- In-service Teacher
Annual Progress Assessment

How many % of program budget should be allocated for Annual Progress Assessment?

It is necessary for Taiwan to learn this issue from experienced countries.
Find a right person to do the right thing
A mechanism for generating efficient policy

• **Vision Setting**
  - Motivator
  - Constructor
  - Inventor
  - Pioneer vs. Follower

• **Policy Makers:**
  - Initiator
  - Decision maker
  - Promoter

• **Action Plan:**
  - Designer
  - Promoter
  - Executor

• **Evaluation:**
  - Annual Assessment Inspector
  - Program Evaluator

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Comments