Completion Report - HRD 02/2011S: Innovation on Problem Solving Based Mathematics Textbooks and e-Textbooks

Purpose: Information
Submitted by: Japan, Thailand
SECTION A: Project profile

| Project number & title          | HRD 02/2011S - Innovation on Problem Solving Based Mathematics Textbooks and E-textbooks |
| Time period covered in report: | November 1, 2011-January 31, 2012 | Date submitted: |
| Committee / WG / Fora:         | APEC Human Resources Development Working Group / Education Network |
| Project Overseer Name:         | Assistant Professor Dr. Maitree Inprasitha, Director of Center for Research in Mathematics Education (CRME), Faculty of Education, Khon Kaen University, Thailand, Male. (will coordinate with Secretariat) |
| Organization / Economy        | Professor Masami Isoda, Director of Japan Society of Mathematical Education, Chief of Mathematics Education in CRICED, University of Tsukuba, Japan, Male. |

SECTION B: Project report and reflection

Briefly answer each of the questions below. Section B should be a maximum of 2-3 pages, inclusive of the questions and tables provided.

1. **Project description:** In 3-4 sentences, describe the project and its main objectives.
   Since the year 2006, Thailand and Japan have been contributing the improvement of education in APEC economies through the movement of Lesson Study for professional development of teachers with good resources and teaching approaches. The project has been progressed as follows:
   2006 Good Practice through Lesson Study by the central fund
   2007 Mathematical Thinking by the central fund
   2008-2009 Mathematical Communication by the central fund
   2010 Assessment by Self-fund
   2011 Mathematics Textbooks, e-Textbooks and Educational Tools by Self-fund
   On these five years, the project achieved the visible approach to improve teacher’s capacity and achievement of children. Based on the past five year project, Thailand and Japan propose this self-fund project for the following object.
   The project has the meeting for:
   1) Sharing the problem solving approach with lesson study which is promising the higher achievement in mathematics at elementary school;
   2) Sharing the knowing how to develop the elementary school textbook which develop children’s problem solving ability;
   3) Sharing the knowing how to use the freeware d-book developed by the University of Tsukuba for developing e-textbook for the classroom with interactive board and internet connection.

2. **Meeting your objectives:** Describe how the project went, with reference to the objectives laid out in your project proposal. Include any major changes to your project as proposed and any problems or obstacles that you encountered and how you overcame them.

   International symposium was held in November 1-5, Thailand. It focused on “Innovation on Problem Solving - Based Mathematics Textbooks and E-Textbooks”. Activities in the conference emphasize on 6 sessions as followings; sessions 1: Keynote Speaker; session 2: Open Class (4 classes); session 3: Invited Speaker; session 4: Specialist Presentations; session 5: Panel Discussions; session 6: Exhibition from school teachers.
3. **Project evaluation:** Describe how you evaluated the project and provide some details on the results of the evaluation (e.g. participant evaluation, peer review of publication, measurement of indicators, statistics demonstrating use of outputs etc.).

The project was evaluated through questionnaire distributing to speakers, panelists and specialists. Some details on the results of the evaluation were as follows;

*On a scale of 1 to 6, please rate how informative each session was for you. A rating of 6 indicates that you found the session highly informative; a rating of 1 that you did not find it informative*

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<th>Session</th>
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<td>Panel Discussion</td>
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Would you like to see more, the same, or less time devoted to the following topics:

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<td>Invited Speakers</td>
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<td>Panel Discussion</td>
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4. **Key findings:** Describe one or two examples of important findings arising from the project (e.g. results from surveys or case studies, insights provided by participants or experts, policy recommendations, roadblocks to progress on an issue etc.).

- Specialists who participated the conference know the promised teaching approach to develop problem solving ability, learn the methods to develop the textbook for the approach and use the d-book.
- Government reduces the huge cost to get the license to use ICT because d-book enable all economies to develop their own e-textbook by free.
- Teachers who teach children can use e-textbook with problem solving approach. Children can learn the problem solving using e-textbook.

5. **Next steps:** Describe any follow-up steps or projects that you recommend. Have you already planned or begun these? What role could APEC play in any follow-up?

We are proposing new project on “Emergency Preparedness Education: Learning from Experience, Science of Disasters, and Preparing for the Future”

The project aims to develop the teaching program against disasters such as Tsunami, Earthquake, Typhoon, Flood, Fire, and Volcanic Eruption:

- **Saving the school children from disasters:** For the school management, the project summarizes the successful and un-successful cases to save our children during disasters with the use of visual materials and share the essential strategies of evacuations in the disasters.
b) **Sharing scientific materials which should be taught in schools:** To prepare teaching programs, the project develops the teaching materials using data which is necessary to scientifically understand the mechanism and influence of disasters.

For the first year the project will focus on Tsunami and Earthquake. The meeting for the knowing and sharing session is scheduled in February, 2012 in Japan. From March to September, 2012, the specialists will develop teaching content through lesson studies. In November, 2012 in Thailand, it finalizes the materials for teaching.

6. **Feedback for the Secretariat:** Do you have any suggestions for more effective management of projects in the future? Any assessment of consultants, experts or participants that you would like to share? (The Secretariat collates and examines feedback to identify trends for ongoing evaluation of our project management and/or communications systems.)
7. **Participant information:** *Please provide details, where applicable. Insert rows as needed.*

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<th># male</th>
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<th>Details</th>
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<td>Madihah Khalid, Universiti Brunei Darussalam,</td>
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<td>Hong Kong, China</td>
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<td>Japan</td>
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<td>Masami Isoda, University of Tsukuba</td>
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<td>Shizumi Shimizu, Teikyo University and the President of Japan Society of Mathematics Education</td>
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<td>Fumi Ginshima, National Institute for Educational Policy Research</td>
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<td>Soledad Ulep, University of Philippines</td>
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<td>Lydia M. Landrito, University of Philippines</td>
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<td>Ivan Vysotskly, Department of Education, Moscow Institute of Open Education</td>
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<td>Maitree Inprasitha, Khon Kaen University</td>
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<td>Auijit Pattanajak, Khon Kaen University</td>
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<td>Utith Inprasit, Ubon Ratchathane University</td>
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<td>2</td>
<td>Catherine Lewis, Mills College</td>
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<td>Akihiko Takahashi, DePaul University</td>
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<td>Patsy Wang-Iverson, Gabriella and Paul Rosenbaum Foundation</td>
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<td>Hoa Anh Tuong</td>
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<td>Other:</td>
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8. **Outputs:** *Please provide details, where applicable.*

<table>
<thead>
<tr>
<th># planned</th>
<th># actual</th>
<th>Details</th>
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</thead>
</table>
# of workshops / events | 1 | 1 | International Symposium in Thailand on November 1-5, 2012
---|---|---|---
# of publications distributed | 1 | 1 | Proceedings of International Symposium
# of CDs distributed |
Other: |

**SECTION C: Budget**

Attach a detailed breakdown of the APEC-provided project budget, including:

- **Planned costs** (using most recently approved budget figures)
- **Actual expenditures**
- **Variance notes**: An explanation of any budget line under- or over-spent by 20% or more.

**SECTION D: Appendices or additions**

Please attach any of the following. This information will help us better understand your project, support overseers of similar projects and plan for future projects.

- List of **experts or consultants** utilised, with job titles and contact details...18...experts
- List of **participants**, with job titles and contact details...490...participants
- **Event agendas**
  - Wednesday 2, November 2011; Registration & Exhibition, Open Class, Keynote Speaker
  - Thursday 3, November 2011; Keynote Speaker, Invited Speaker, Specialists Presentation
  - Friday 4, November 2011; Invited Speaker, Specialists Presentation
  - Saturday 5, November 2011; Specialist presentation, Panel Discussions
- Links to any relevant **websites or online material** (e.g. reports, resources created)
  - [http://apec-lessonstudy.kku.ac.th](http://apec-lessonstudy.kku.ac.th)
- **Results of participant feedback or other project evaluation** (raw and/or analysed)
- Any other relevant information or resources that would help us learn more about your project
  - [http://www.criced.tsukuba.ac.jp/math/](http://www.criced.tsukuba.ac.jp/math/)
  - [http://www.crme.kku.ac.th](http://www.crme.kku.ac.th)

**FOR APEC SECRETARIAT USE ONLY**

APEC comments: Were APEC project guidelines followed? Could the project have been managed more effectively or easily by the PO?
HRD 02/2011S

Innovation on Problem Solving-based Mathematics Textbooks and E-textbooks

Proposing by : Thailand and Japan

Looking back on Lesson Study since 2006

HRD 03/2006

A Collaborative Study on Innovations for Teaching and Learning Mathematics in Different Cultures among the APEC Member Economies

Aims

• To collaboratively develop innovations on teaching and learning mathematics in different cultures of the APEC Member Economies.

• To develop a collaborative framework involving mathematics education among its members.
Phase I: Symposium and Workshop on “Innovative Teaching Mathematics through Lesson Study”

Participants: 38 international and 235 Japanese participants
Host: CRICED, University of Tsukuba
Date: 15-20 January 2006

Phase III: International Symposium on “Innovation and Good Practices for Teaching and Learning Mathematics through Lesson Study”

Aim: sharing and reflecting on research results and good practices as discovered by research teams of the economies.

Participants: 45 international and 203 Thai participants
Host: CRME, Khon Kaen University
Date: 14-17 June 2006.
Phase IV: An APEC Workshop on “Improving the Quality of the Mathematics Lesson through Lesson Study”

Host: Thailand
Date: 24 - 27 August 2006

Japanese teaching method was introduced to Thai teachers by Japanese teachers in the manner of a workshop on Lesson Study.

HRD 02/2007: Collaborative Studies on Innovations for Teaching and Learning Mathematics in Different Cultures II
- Lesson Study focusing on Mathematical Thinking-

Aims
• To share the ideas and ways of mathematical thinking which are necessary for science, technology, economic growth and development of the APEC member economies.
• To develop the teaching approaches in mathematical thinking through Lesson Study among the APEC member economies.
### Phase I: APEC - Tsukuba

**International Conference on Innovative Teaching Mathematics through Lesson Study II**

- **Focusing on Mathematical Thinking** -

**December 2 – 7, 2006**

Tokyo & Sapporo, JAPAN

37 international and 112 Japanese participants

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### Phase III: APEC – Khon Kaen 2007

**International Symposium on Innovative Teaching Mathematics through Lesson Study II**

- **Focusing on Mathematical Thinking** -

**August 16-20, 2007 at Khon Kaen**

**Aim:** To share teaching approaches for developing mathematical thinking by economies

30 international and 349 Thai participants
Phase IV: APEC Workshop on: Improving the Quality of the Mathematics Lesson through Lesson Study

15-16 August, 2007 at Khon Kaen

Teachers from the Attached Elementary School of the University of Tsukuba, Japan came to Thailand to demonstrate two phases of Lesson Study – teaching Thai students in the real classroom and reflecting on teaching with Thai teachers.

HRD 02/2008: Collaborative Studies on Innovations for Teaching and Learning Mathematics in Different Cultures III

- Lesson Study focusing on Mathematical Communication -

Aims:

• To collaboratively share the ideas and ways of Mathematical Communication for knowledge-based society which is necessary for science, technology, economical life and development on the APEC member economies.

• To Collaboratively develop the teaching approaches on Mathematical Communication through Lesson Study among the APEC member economies.
Phase I

Conference Organizations:
Organized by University of Tsukuba, Co-organized by Ministry of Education, Culture, Sports, Science and Technology (MEXT), Japan, Nara Women’s University, Khon Kaen University (KhonKao), Supported by Japan International Cooperation Agency (JICA), Japan Society of Mathematical Education, Japan Society of Science Education.

APEC HRDWG Project;
Collaborative Studies on Innovations for Teaching and Learning Mathematics in Different Cultures (III) - Lesson Study focusing on Mathematical Communication.

Project Overview:
Masana Inoue, Shunji Kanem, Maitree Ingamitha, SudaddLoepa

Project Websites:
http://www.minc.tsukuba.ac.jp/hsath/asec/
http://apec-pbweb.com/ThematicProjects/throughLessonstudy
http://mathinfo.minc.tsukuba.ac.jp/
http://math.info.jbr.asec

Project References:
http://www.aesc/knowledgebank.org/
http://ssl王牌.minc.tsukuba.ac.jp/mathinfo_data/lno1462
http://math.info.tsukuba.ac.jp/mathinfo/ssl王牌1462_0701.pdf

Phase III

45 International and more than 300 Thai Participants
Phase IV: International Symposium in New South Wales, Australia

Date: 16-18 March, 2009

The lessons were studied by 133 teachers from different schools in the first two days of the conference and 128 teachers in the second two days.

APEC HRD 01/2010S “Lesson Study for Implementing Curriculum: Developing Innovative Assessment Problem”
APEC-Chiang Mai International Symposium IV
Innovation of Teaching and Learning Mathematics through Lesson Study: Connection between Assessment and Subject matters

2-6 November, 2010 at Chiang Mai University
APEC-Tsukuba International Conference V

19-22 February, 2011 at Tokyo and Tsukuba, Japan

HRD 02/2011S

Innovation on Problem Solving-based Mathematics Textbooks and E-textbooks
International symposium in Thailand 2011

Activities in the conference emphasize on 6 sessions as followings: sessions 1: Keynote Speaker; session 2: Open Class (4 classes); session 3: Invited Speaker; session 4: Specialist Presentations; session 5: Panel Discussions; session 6: Exhibition from school teachers.

International symposium in Thailand
The project has the meeting for:

• 1) Sharing the problem solving approach with lesson study which is promising way for higher achievement in mathematics at elementary school;
• 2) Sharing the knowing how to develop the elementary school textbook which develop children's problem solving ability;
• 3) Sharing the knowing how to use the freeware d-book developed by the University of Tsukuba for developing e-textbook for the classroom with interactive board and internet connection.

Keynote Speakers and Specialists from each Economy

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<th>Economy</th>
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<td>Total</td>
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23 specialists and 490 Thai participants
On a scale of 1 to 6, please rate how informative each session was for you. A rating of 6 indicates that you found the session highly informative; a rating of 1 that you did not find it informative.

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• Specialists who participated the conference know the promising teaching approach to develop problem solving ability, learn the methods to develop the textbook for the approach and use the d-book.
• Government reduces huge budget to get the license to use ICT because d-book enable all economies to develop their own e-textbook by free.
• Teachers who teach children can use e-textbook with problem solving approach.
• Children can learn the problem solving using e-textbook.

### Key findings

### Outputs

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<th># planned</th>
<th># actual</th>
<th>Details</th>
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<td>1</td>
<td>1</td>
<td>International Symposium in Thailand on November 1-5, 2012</td>
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<tr>
<td># of publications distributed</td>
<td>1</td>
<td>1</td>
<td>Proceedings of International Symposium</td>
</tr>
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</table>
An exemplar of using Dbook in Thai Classroom

Non-Interactive Version

3. Thinking about How to Calculate

1. There are 4 boxes with 12 caramel candies in each one. All 48 caramel candies are divided equally among 3 children. How many will each child receive?

Write an equation. 

2. Think about how to calculate the answer by using what you have learned.

Think about how to calculate the answer in different ways and explain why these ways come up in calculations.

Abbildung 1.5

First, I give 1 box to each of the 3 children. Then I divide the last 12 among the 3 children.

12 + 3 = 4

There are 12 candies in one box, so the amount of candy for one child is

12 ÷ 4 = 3

6 + 3 = 9

so 8 x 2 =

6 + 3 = 9

45 - 6 - 5

5 x 3

I used a rule of division.

Because the dividends are the same, the answer increases by 2 times if the divisor decreases by half.

45 - 6 - 5

30 ÷ 6 = 10

5 x 3

18 + 3 = 6

10 + 5

36

2. Calculate 56 ÷ 4 using various ways.
• Aim of this lesson: Students using what they have learned to calculate 48 ÷ 3.
• Teacher needed her students to compare their ideas with the ideas in textbook in order to extend their own ideas.
• Interactive function is required to:
  - stimulates students’ attention.
  - supports teacher to pose problem situation in easy way.
  - using hiding function of Dbook to supports students’ learning by comparing with the ideas in textbook.
  - provides tools for teacher and students to illustrate their thinking.
Interactive Version: Dbook

Hiding function

Dbook is compatible with Pen Grand Master

‘DbookPro in Thai Classroom’

Dbook Sample:


How to use Dbook for developing e-textbook

Masami Isoda
University of Tsukuba
What is Lesson Study?
It is a way of challenge for improvement.

Teachers engage in improvement of their practice within groups through ‘Plan, Do and See’ processes. It enable teachers to develop students and enable us to improve curriculum and to learn what is professional development, and so on.

A teacher is a challenger.

Extension and Generalization

What you can read from the black board.
with textbook and blackboard

dbook

- dbook, commercial software, is developed by Japanese textbook companies. University of Tsukuba provides English version of dbook by free on the aim of educational cooperation.
- Newest version of dbook will support multimedia such as video files, as well as textbooks, pictures, graphing and computer simulations.
In classroom, with textbook and blackboard

**Procedure to develop dbook:**

*developed by minimum number of specialists, used by thousands of teachers, learned by millions of students*

**First Step**

a) Scanning the Textbook by jpg format

b) Selecting and Developing the Embedding Contents

eg. Dynamic Geometry files by GCL

Contents by Action Script

Video files by flv format

c) Selecting and Developing Link Contents by jpg format

**Second Step**

d) Reading jpg textbook file into dbook

e) Pasting all necessary and meaningful contents on dbook

f) Hiding contents to show e-textbook as same as printed textbook

**Extended Textbook: Meaningful with a number of rescuers**

**Distribution on WEB**