Asia-Pacific
Economic Cooperation

2013/SOM3/HRDWG/053
Agenda Item: EDNET

Report: S HRD 06 11A - Promoting Best Practices on Mathematical Modelling Course in Higher Education Curriculum of APEC Economies

Purpose: Information
Submitted by: Indonesia

APEC INDONESIA 2013

35th Human Resources Development Working Group Meeting
Medan, Indonesia
24-26 June 2013

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Report: S HRD 06 11A
Promoting best practices on Mathematical Modelling Course in higher education curriculum of APEC economies

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Prof. Dr. Edy Soewono

Human Resources Development Working Group – Education Network

Asia-Pacific Economic Cooperation

Proposing APEC economy: Republic of Indonesia
Co-sponsoring economies: USA, Japan, Republic of Korea, Australia, People Republic of China, Thailand

Period: March – December 2012

Source of funds : APEC Support Fund
Total amount from APEC: US$57,000

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Objectives:

- ✓To enhance understanding on the importance of designing the curriculum of Mathematical Modelling course which have direct link to real-world-driven problems.
- ✓To share experiences within APEC economies on best practices of Mathematical Modelling activities and disccuss effective strategies to improve quality of Mathematical Modelling course. The best practices of APEC economies and results of the discussion will be documented in order to give wider access to other economies willing to improve their curricula.

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Objectives (contnd):

- ✓To promote the practical use of Mathematical Modelling in various aspects of economy and industry and establish Industrial Mathematics network among interested mathematician in APEC economies.
- ✓To provide inputs and recommendations to the forthcoming APEC Education Ministerial Meeting in 2012 on the Mathematics and Science Education priority area. The recommended standards of good Mathematical Modelling curriculum are collected for comparisons and analyses. However in this early stage, they are not intended to be developed as APEC Mathematics and science standards.

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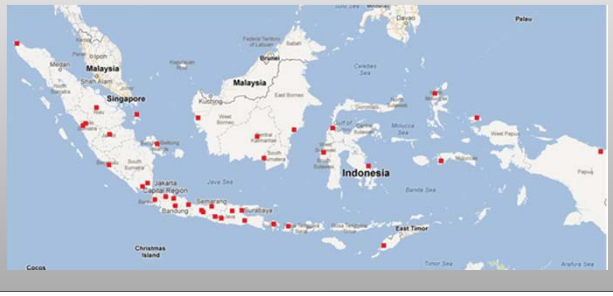
Activities:

- Workshop on "Promoting best practices on Mathematical Modelling Course in APEC economies", in October 22-23, 2012, at Institut Teknologi Bandung, Indonesia.
- The participants are from Malaysia, Thailand and Indonesia. The cities of origin of the participants which are spead from Banda Aceh (5° 31' North and 95° 25' East), to Jayapura Papua (2° 32' South and 40° 42' East). Some of participants are also coming for ALCoB (APEC Learning Community Builder) Indonesia section.



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Speakers of the workshop:

1. Dr. Jeffery Waldock (Sheffield Hallam University), "Developing Graduate Skills through Mathematical Modelling in the Higher Education Curriculum"
2. Prof. Edy Soewono (ITB), "Mathematical Modeling at MA ITB : Bringing real world problems into class room activities"
3. Mr. Joshua P. Abrams (Meridian Academy, USA), "Mathematical Modeling for High School Students"
4. Mr. Roberto Araya (Center for Advanced Research on Education, Universidad de Chile), "Introducing Mathematical Modeling Skills in the Curriculum"
5. Prof. Masami Isoda (Center for Research on International Cooperation in Educational Development, University of Tsukuba, Japan), "Mathematical Modeling for Emergency Preparedness Education".

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6. Prof. Jonathan Borwein from CARMA (Centre for Computer-Assisted Research Mathematics and its Applications) in University of Newcastle, Australia, which gives presentation via teleconference with title "CARMA and Me, for 23-10-2012 ITB-APEC Workshop".
7. Prof. Septo R. Siregar from Faculty of Mining and Petroleum Engineering – ITB, "The Role of Mathematical Modeling in Solving Oil & Gas Industries Field Problems".

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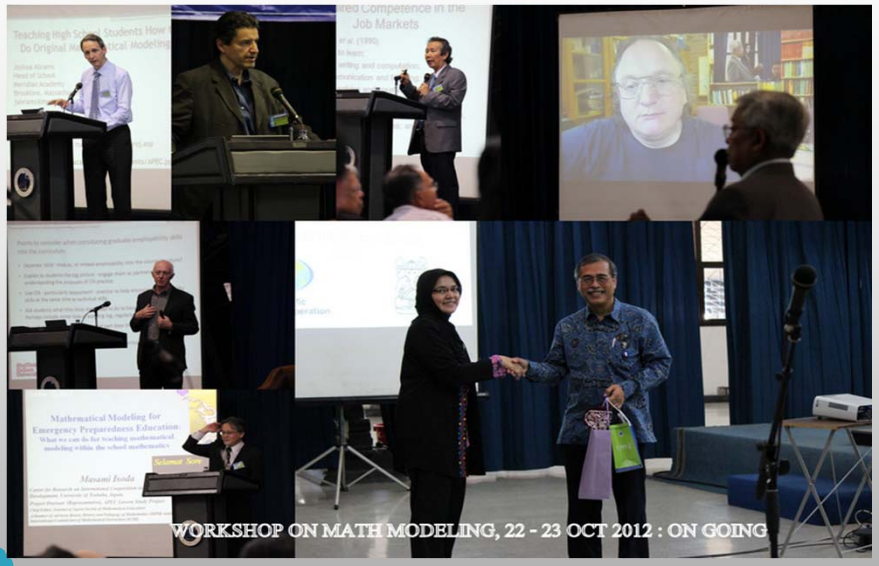

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•Additional workshops

Workshop on Development of Graduate Skills in Mathematics Curriculum,
20 October 2012.

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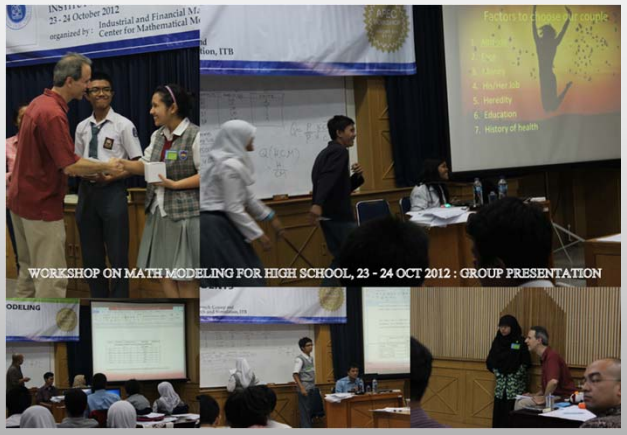
Workshop on "Mathematical Modeling for High School Students",
23 – 24 Oct 2012



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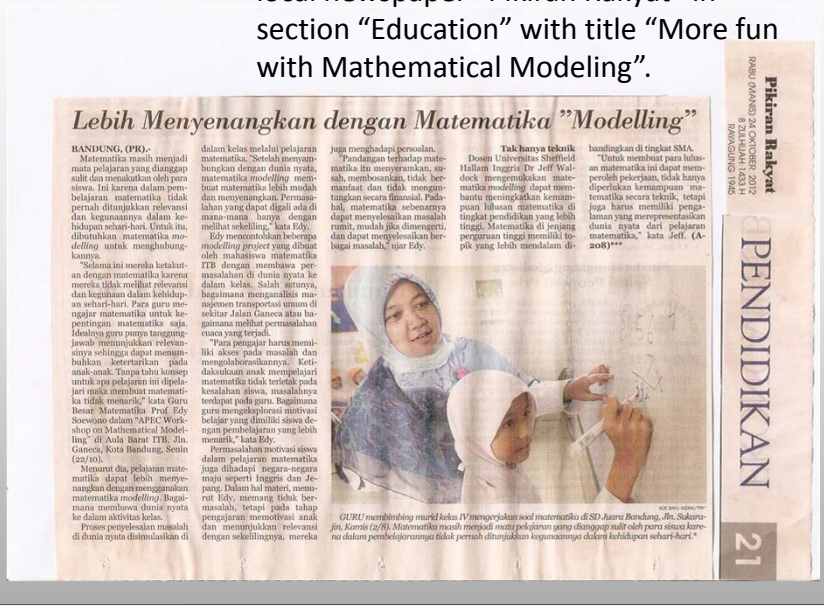
The workshop opening was covered in a local newspaper "Pikiran Rakyat" in section "Education" with title "More fun with Mathematical Modeling".



Pikiran Rakyat
RABU (MANIS) 24 OKTOBER 2012
8 ZULHIJAH 1433 H
BANDUNG 1945

PENDIDIKAN 21

Lebih Menyenangkan dengan Matematika "Modelling"

BANDUNG, (PR).-
Matematika masih menjadi mata pelajaran yang dianggap sulit dan menakutkan oleh para siswa. Ini karena dalam pembelajaran matematika tidak pernah ditunjukkan relevansi dan kegunaannya dalam kehidupan sehari-hari. Untuk itu, dibutuhkan matematika *modelling* untuk menghubungkannya.

"Selama ini mereka ketakutan dengan matematika karena mereka tidak melihat relevansi dan kegunaan dalam kehidupan sehari-hari. Para guru mengajar matematika untuk kepentingan matematika saja. Idealnya guru punya tanggung jawab menunjukkan relevansinya sehingga dapat menumbuhkan ketertarikan pada anak-anak. Tanpa tahu konsep untuk apa pelajaran ini dipelajari maka membuat matematika tidak menarik," kata Guru Besar Matematika Prof. Edy Soewono dalam "APEC Workshop on Mathematical Modelling" di Aula Barat ITB, Jln. Ganeca, Kota Bandung, Senin (22/10).

Menurut dia, pelajaran matematika dapat lebih menyenangkan dengan menggunakan matematika *modelling*. Bagaimana membawa dunia nyata ke dalam aktivitas kelas.

Proses penyelesaian masalah di dunia nyata disimulasikan di dalam kelas melalui pelajaran matematika. "Setelah menyambungkan dengan dunia nyata, matematika *modelling* membuat matematika lebih mudah dan menyenangkan. Permasalahan yang dapat digali ada di mana-mana hanya dengan melihat sekeliling," kata Edy.

Edy mencontohkan beberapa *modelling project* yang dibuat oleh mahasiswa matematika ITB dengan membawa permasalahan di dunia nyata ke dalam kelas. Salah satunya, bagaimana menganalisis manajemen transportasi umum di sekitar Jalan Ganeca atau bagaimana melihat permasalahan cuaca yang terjadi.

"Para pengajar harus memiliki akses pada masalah dan mengolaborasikannya. Ketidaksukaan anak mempelajari matematika tidak terletak pada kesalahan siswa, masalahnya terdapat pada guru. Bagaimana guru mengeksplorasi motivasi belajar yang dimiliki siswa dengan pembelajaran yang lebih menarik," kata Edy.

Permasalahan motivasi siswa dalam pelajaran matematika juga dihadapi negara-negara maju seperti Inggris dan Jepang. Dalam hal materi, menurut Edy, memang tidak bermasalah, tetapi pada tahap pengajaran memotivasi anak dan menunjukkan relevansi dengan sekelilingnya, mereka juga menghadapi persoalan.

"Pandangan terhadap matematika itu menyeramkan, susah, membosankan, tidak bermanfaat dan tidak mengantungkan secara finansial. Padahal, matematika sebenarnya dapat menyelesaikan masalah rumit, mudah jika dimengerti, dan dapat menyelesaikan berbagai masalah," tijar Edy.

Tak hanya teknik
Dosen Universitas Sheffield Hallam Inggris Dr Jeff Waldock mengemukakan matematika *modelling* dapat membantu meningkatkan kemampuan lulusan matematika di tingkat pendidikan yang lebih tinggi. Matematika di jenjang perguruan tinggi memiliki topik yang lebih mendalam dibandingkan di tingkat SMA.

"Untuk membuat para lulusan matematika ini dapat memperoleh pekerjaan, tidak hanya diperlukan kemampuan matematika secara teknik, tetapi juga harus memiliki pengalaman yang merepresentasikan dunia nyata dari pelajaran matematika," kata Jeff. **(A-208)***

GURU membimbing murid kelas IV mengerjakan soal matematika di SD Juara Bandung, Jln. Sukarajan, Kamis (2/8). Matematika masih menjadi mata pelajaran yang dianggap sulit oleh para siswa karena dalam pembelajarannya tidak pernah ditunjukkan kegunaannya dalam kehidupan sehari-hari.

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Feedback from Participants of Workshop on **"**Promoting best practices on Mathematical Modelling Course in APEC economies", in October 22-23, 2012

•Overall, are you satisfied with the organization of this workshop? Yes (100%)

•Do you get new things from this workshop? Please verify.

- ❑ Mathematical modeling for the tsunami.
- ❑ In other countries (for instance UK), curriculum for high school level is not determined by the government, but by the school in the case of mathematics learning.
- ❑ This workshop has reinforced what I was doing currently on mathematical modeling for Economy, Finance and Industry.
- ❑ This workshop gives broader picture of research on mathematical modeling
- ❑ The process of problem solving

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Feedback

•Do you get some impact after following this workshop? Is there any change on your opinion about Math Modeling before and after following the workshop?

- ❑ Yes there is. It has enriched my knowledge on many cases of Math modeling for teaching purposes
- ❑ It made me more interested in Math modeling because it can solve any problems in this world, from the simplest to more complex problems.
- ❑ It motivates me to continue my work on Math modeling
- ❑ My understanding on Math modeling is increasing, especially on the model of the mitigation of disaster from Japan.
- ❑ It has widen my mind so there are many things can be done using Math modeling
- ❑ It is important to implement Math modeling in learning activities.

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Concept Note:
Establishment of a Network on Promoting Mathematical Modelling Course in the Curriculum of Higher Education

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Human Resources Development Working Group – Education Network

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APEC Concept Note

Proposing APEC economy: Republic of Indonesia and Thailand

Co-sponsoring economies: Australia, Chinese Taipei, Korea, Chile, Japan

Period: January 2014 – December 2015

Source of funds : APEC Support Fund

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Project summary:
Problem-solving skills on Mathematics and Science are important for students to prepare them as adaptable and professional workforce. They will have career options broader than traditional career choices such as teacher and researcher. Lesson learned from the previous project, there is still low awareness of the importance of Mathematical Modeling Course with direct link to real-world problems. **The objective of this project is to establish a network on promoting Mathematical Modeling Course in all education levels, especially in the Curriculum of Higher Education.** There will be problem solving workshops using Mathematical Modeling in Indonesia and Thailand, and also wokshop on promoting best practices on Mathematical Modelling Course in Thailand.

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Objectives:

- ✓ Having low participation of developed and developing countries from the previous project, we still need to enhance understanding on the importance of designing the curriculum of Mathematical Modelling course which have direct link to real-world-driven problems.
- ✓ We want to share activities on Mathematical Modelling within APEC economies, especially in Thailand and Indonesia
- ✓ By organising a workshop, we promote the practical use of Mathematical Modelling in various aspects of economy and industry.

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Objectives: (contnd)

- ✓ We want to provide inputs and recommendations to the forthcoming APEC Education Ministerial Meeting on the Mathematics and Science Education priority area. The recommended standards of good Mathematical Modelling curriculum are collected for comparisons and analyses. However in this early stage, they are not intended to be developed as APEC Mathematics and science standards.

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Alignment:

The project will help to achieve the Leaders' commitment of the Yokohama Vision – Bogor and beyond in 2010 under the human resource and entrepreneurship development agenda. It will help to implement policies that will enhance education and training with equal opportunities for women, youth, the elderly, and all other sectors.

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Alignment:

The project will support the Inclusive Growth attribute of the APEC Leaders' Growth Strategy, especially in promoting job creation, human resource development, and active labour market policies by improving the quality of education focused on skills and competencies needed in the 21st century workplace.

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Alignment:

The project will also help to implement the Action Plan for Developing Human Resources, Vigorously Promoting Employment, and Achieving Inclusive Growth developing which includes "Promote competencies and skills of future work through quality technical and vocational education and training to enhance employment and build a more competent APEC workforce".

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Alignment:

In 2012 Vladivostok Declaration, the APEC Leaders agree on strengthening collaboration among APEC economies by enhancing practical and sustainable educational cooperation, and exploring a number of proposals for cross border education within the region as well as research, information, and knowledge sharing. This project will support on "Enhancing the mobility of researcher" by developing joint research activities between and among universities in APEC economies, and on "Enhancing the mobility of education providers" by benchmarking and identifying best practices in APEC on quality assurance systems, especially in Mathematical Modeling course.

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Task	APEC Funding	Date
Preparation and Organization of Mathematical Modeling week for Researcher and Students in Indonesia	Transportations and accommodation	Feb 2014 – July 2014
Preparation and Organization of Mathematical Modeling week for Researcher and Students in Thailand	Transportations and accommodation	Sep 2014 – Nov 2014
Conference	Transportations and accommodation for participants	Nov 2014
Report writing	Printing and publication	Dec 2014

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We invite you
to co-sponsor our Concept Note and
to share your Applied Mathematics curricula in Higher Education.

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