Progress report of the APEC project: "A Collaborative Study on Innovations for Teaching and Learning Mathematics in Different Cultures among the APEC Member Economies"

APEC - TSUKUBA International Conference

"Innovative Teaching Mathematics through Lesson Study"

Date: January 15th – 20th, 2006

Place: JICA Institute for International Cooperation
(10-5 Honmura-cho Ichigaya Shinjuku-ku, Tokyo 162-8433)

Host organization: University of Tsukuba

Co-sponsors: Ministry of Education, Culture, Sports, Science and Technology of Japan (MEXT), Japan International Cooperation Agency (JICA)

Supporters' organization : Ministry of Foreign Affairs, Japan, Japan Society of Mathematical Education (JSME), Japan Society for Science Education (JSSE)

Forward

This is the progress report on the APEC project "A Collaborative study on innovations for teaching and learning mathematics in different cultures among the APEC Member Economies". It included the result of APEC - Tsukuba International Conference.

At the third APEC Education Ministerial Meeting held on 29-30 April 2004 in Santiago, the ministers defined four priority areas for future network activities. "Stimulating Learning in Mathematics and Science" is one of the four priority areas. Based on this priority, the project "A Collaborative study on innovations for teaching and learning mathematics in different cultures among the APEC Member Economies" was approved by APEC Member Economies in August 2005. The project is managed by the Center for Research in Mathematics Education (CRME) in Khon Kaen University and the Center for Research on International Cooperation in Educational Development (CRICED) in University of Tsukuba. At the first stage, we held APEC - Tsukuba International Conference on 'Innovative Teaching Mathematics through Lesson Study', in January 15-20th in Tokyo. The aim was to share research questions and develop collaborative framework for the implementation of innovative scheme in teaching and learning of mathematics. For stimulating learning in mathematics and science, we focused on Lesson Study to develop good practices as a way of innovation. We used VTR for sharing lesson and tried to clarify Lesson Study method and good practice. Those two are major features through project which contributes improvement of education, especially mathematics and science, in members of economies.

Based on financial support of APEC project and University of Tsukuba, the project organized following meetings:

- Survey of Mathematical Literacy in OECD-PISA and the Lesson Study movement in Developing Countries: Improving the Quality of Education for Developing Numeracy on Education for All
- APEC Open symposium: "International Symposium on Innovative Teaching Mathematics through Lesson Study"
- APEC Specialist session: "International workshop on Innovative Teaching Mathematics through Lesson Study". Including school visits to know what Japanese Lesson Study is.

The conference has 226 participants and observers from 13 members of economies and 7 other countries. 13 members: Australia, Chile, China, Hong Kong, Indonesia, Japan, Korea, Malaysia, Philippines, Singapore, Thailand, USA and Vietnam (alphabetical orders).

Followings are targets and results of the Tokyo conference 'Innovative Teaching Mathematics through Lesson Study'

- In order to develop a research proposal and collaborative framework for the implementation of innovation scheme in teaching and learning mathematics;
  - We shared good practices as models of lessons and lesson studies for developing good practices in each members of economies.
  - We shared Japanese Lesson Study which is a recommended way of professional developments, implementing curriculum and developing good practices.
  - We elaborated the study paper format for Thailand session
    - Good practice is defined by outcome.
    - Present good practice as a result of Lesson Study.
    - Lesson VTR is necessary for sharing good practice.
    - Defined format of the paper and VTR.

Through the conference, we discussed the conditions of good practice and the meanings of lesson studies. The former is related with the way of view a lesson. The discussion on the meanings of lesson studies is very important at shearing processes. We can categorize presented lesson studies as follows;

First category is comparative studies on lesson studies by researchers focused on cultural-educational differences behind lessons. We learned from following economies reports; TIMSS video tape study: Lecture from Hong Kong, Learners Perspective Study; Lecture and Reports from Hong Kong, Korea and Philippines

Second category is lesson studies for developing good practices by teachers and math-educators. They are focused on improvement of the qualities of education: students learning, teaching approaches, developing subject matter, curriculum implementations and professional development. Following economies' reports focused on ideas for developing practice; Australia, Chile, China, Indonesia, Japan, Malaysia, Singapore, Thailand, USA and Vietnam.

Both categories are useful and very important for our research project, "A Collaborative study on innovations for teaching and learning mathematics in different cultures among the APEC Member Economies". In relation to our project, first perspective on comparative study contributed to know cultural differences and second perspective on improvement of the qualities of education contributed to share the idea of innovation. Based on these fruitful discussions, we recognized both perspectives are very important and for developing good practices, we preferred Japanese meanings of Lesson Study. Even if we focused on Lesson Study there are varieties of meanings and implementing processes depending on economies but we shared Lesson Study method that it done by teachers' group, elaborating lessons each other through observing lessons each others. Such as the cycle of 'plan (preparation), do (study lesson: observation), see (reflection)'

We preferred Lesson Study from following reasons: First, it is focused on

improvement of the qualities of education in general. It is a way of professional development in any subject. Secondly, it is well known methods in other economies and already adopted at some economies such as USA, Indonesia and Thailand. Especially in USA, there is reform movement based on Lesson Study (See 'Before it too late: A Report to the Nation from the National Commission on Mathematics and Science Teaching for the 21st Century (2000)'). Thirdly, because Lesson Study have already been adopted in economies, we can share the good experience, knowing what the significant of Lesson Study and knowing how to manage the Lesson Study project in each other. For example, US Lesson Study project and Thailand project show the real meaning of Lesson Study by their given data. Fourthly, mathematics is a most easily subject to share the idea of teaching approach. Beginning from mathematics, we can influence the idea of Lesson Study to the other subjects such as science.

The 'APEC International Symposium on Innovation and Good Practice for Teaching and Learning Mathematics through Lesson Study' will be held in Khon Kaen, Thailand in June 14-17th, 2006. In that symposium, we expect contributions from members of economies as their result of lesson studies based on developed frame work in Tokyo meetings. Through these processes, we share the methods of Lesson Study and good practices with VTRs which are useful for innovation of mathematics education in each member economy. We are looking forward to meet each other again and to share the good practices of mathematics teaching with VTR which are developed through Lesson Study.

We would like to acknowledge supported and contributed governmental organizations and institutions. APEC project "A Collaborative study on innovations for teaching and learning mathematics in different cultures among the APEC Member Economies" is proposed from Thailand. The conference is organized by the University of Tsukuba with the organizing committee with support of APEC Project Overseers, co-organized by : Ministry of Education, Culture, Sports, Science and Technology of Japan (MEXT) and Japan International Cooperation Agency (JICA), supported by Ministry of Foreign Affairs of Japan (MOFA), Japan Society of Mathematical Education (JSME), Japan Society for Science Education (JSSE). At last part of this forward, we would like to note the names of Takeshi Miyakawa, Kazuhiro Aoyama and Kimiho Chino, researcher of CRICED, that we could not complete this progress report without their hard editorial works.

March 31, 2006

APEC Project Overseers

Masami Isoda and Shizumi Shimizu (University of Tsukuba, Japan)

Suladda Loipha and Maitree Inprasitha (Khon Kaen University, Thailand)

Organizing Committee of the APEC - Tsukuba International Conference

Chair	Masami ISODA	(University of Tsukuba)
Program Chair	Shizumi SHIMIZU	(University of Tsukuba)
Committee	Kazuyoshi OKUBO	(Hokkaido University of Education)
	Yoshinori SHIMIZU	(University of Tsukuba)
	Minoru YOSHIDA	(Shinsyu University)
	Noboru SAITO	(Naruto University of Education)
	Takuya BABA	(Hiroshima University)
	Hiroyuki NINOMIYA	(Ehime University)
Editors	Takeshi MIYAKAWA	(University of Tsukuba)
	Kazuhiro AOYAMA	(University of Tsukuba)
	Kimiho CHINO	(University of Tsukuba)

GREETING ADDRESS

Yoichi Iwasaki
President of the University of Tsukuba

I would like to welcome you all sincerely. As the president of the University of Tsukuba, I would like to say a few words for the opening of the University of Tsukuba and Asian Pacific Economic Cooperation Conference on 'Innovative Teaching Mathematics through Lesson Study'.

This conference is following on the Third APEC Education Ministerial Meeting that was held in April 2004 in Chile, putting "Skills for the Coming Challenges" as its whole theme. "Stimulating Learning in Mathematics and Science" is one of the four priority areas in the theme. In this conference, we would like to make use of excellent research results in mathematics education for contributing to APEC activities regarding the priority area. University of Tsukuba has supported and extended the joint research with Khon Kaen University on 'A Collaborative Study on Innovations for Teaching and Learning Mathematics in Different Cultures among the APEC Member Economies', which is a project under Education Network of APEC Human Resources Development Working Group. Center for Research on International Cooperation in Educational Development (CRICED) in the University of Tsukuba is aiming at sharing academic research results on mathematics education among APEC economies through its various activities.

The University of Tsukuba has been accepting researchers and students from all over the world under the policy of "internationally opened university," ever since its foundation. We promote large scale collaborative international research and conduct active international exchange activities. We are in partnership with international bodies such as UNESCO and World Bank. We have established APEC Research Center within the university in order to actively engage in APEC activities.

The University of Tsukuba has a long standing tradition in teacher training since its former body, first Normal School, funded in 1873, and has achieved significant results in education research. Currently, the specialized research on classroom practice called "Lesson Study" has been the focus of international attention from all concerned. This "Lesson Study", I've heard, has originated from educational practices of teacher training of former body.

In addition the University of Tsukuba, we had engaged in the Japan – US collaborative research on mathematics problem solving in the 1980's, and also held the international conference of the Psychology of Mathematics Education in 1993, as well as the international conference on the use of technology in mathematics in 1998. We have played an active role in introducing Japanese research activities on the

mathematics education to the world.

In taking into account such a history of academic exchange and educational research and growing needs for international cooperation in education in developing countries under the theme of “Education for All”, University of Tsukuba has established the CRICED in 2002 and served as a core center under the network of MEXT, Ministry of Education Culture Sports Science and Technology, for international cooperation. We hope to try to contribute the developments of APEC economies based upon the educational research results from Japanese education practices.

Lastly, I would like to extend our gratitude to the supporters of the meeting, especially Dr. Chira Hongladarom from APEC Lead Shepherd who invited us to co-host this time as well as the co-organizers MEXT and JICA, as well as Ministry of Foreign Affaires and other academic organizations. We hope the conference would be a full opportunity for the participants from APEC economies.

That concludes my remarks. Thank you so much.

GREETING ADDRESS

Masayuki Inoue
Director-General for International Affairs, MEXT

Good morning ladies and gentlemen. My name is Masayuki Inoue, Director-General for "International affairs of the Ministry of Education, Culture, Sports, Science and Technology." This ministry has existed since 2001 as a result of the merger of ex-*Monbusho* and *ex*-Science and Technology agency, which was very timely for the future of education and science and technology.

Distinguished participants, ladies and gentlemen; I would like to express my sincere thanks to professor Iwasaki, the president of University of Tsukuba, and those lecturers who came a long way from various parts of the world.

It was two years ago in April 2004, in Santiago, Chile, that a Third APEC Education Ministerial Meeting was held. At the meeting, four priority areas were identified, as were "English and other foreign language learning", " Stimulating learning in Mathematics and Science", "Using ICT for teaching and learning", and "Governance and Systematic reform in education". Those countries concerned were to address those priorities in cooperation. This symposium is a follow up of the ministers' meeting. Japan has been a fine contributor in the area of math and science education, both in the APEC and a bilateral framework and has been cooperating with the Philippines, Indonesia and Cambodia for their improvement of such education.

As I said, in the APEC meeting, that ICT was listed one of the topics. Last week, together with his Excellency Kosaka, I attended the meeting in London, which was organized by the Department of Education and Skills of the UK government, and in which Ministerial level representatives from 60 countries participated. The audience was one hundred fifty members gathered in London. The potential of ICT was discussed actively during the meeting. I believe mathematics and science education, and ICT will become an increasingly important agenda for the future meetings of this nature.

There is a study called PISA hosted and conducted by OECD. Japan is ranked among top countries as to scientific literacy and mathematics literacy, according to the reports of a PISA study in 2000 and 2003.

On the other hand, students keep themselves away from science and mathematics education. This is probably the same as the case with the countries gathered here and is a very big problem. The 21st century is called "the century of knowledge economy," where we should entirely rely on people's knowledge and wisdom. In such an era, I think, avoidance of science and mathematics is a great disadvantage.

In this context, by studying the history and background of the development of the math and science education in Japan, how to address the problem we face today will be examined in this symposium, which will be highly meaningful to us. So, this, I believe, is the opportunity for everyone to share experiences, knowledge and to learn each other. And I'm convinced that this symposium will contribute greatly in making improvements in study on classroom and teaching methods of the mathmatics and science education in the APEC region.

Lastly, I would like to express my gratitude for the government of Thailand and University of Tsukuba. I would like to close my opening remarks. Thank you very much.

CONTENTS