4th APEC EDUCATION MINISTERIAL MEETING
JOINT STATEMENT

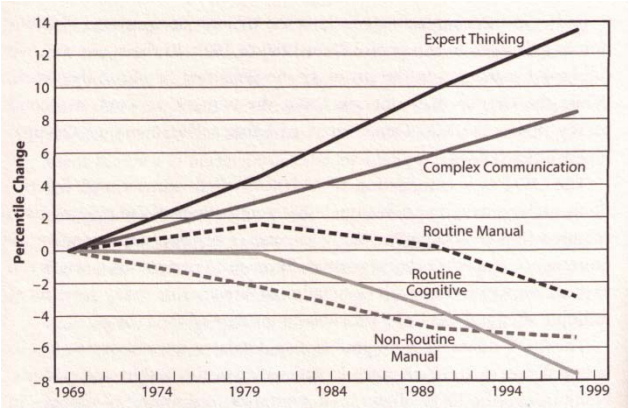
ANNEX A

EDUCATION TO ACHIEVE 21ST CENTURY COMPETENCIES FOR ALL

I. Background

Nearly a decade into the 21st Century, a broad consensus is emerging from research and development about the critical need for students to have 21st century competencies such as problem solving and technological savvy. Competencies are critical for today's workforce and will be essential for the workforce of tomorrow. On an individual level, these competencies affect educational and professional opportunities and, on a large scale, they impact the quality of the labor force and, ultimately, the strength of the international economy.

As the chart below illustrates, Murnane and Levy (2004) have documented that with the advent of new information communication technologies, there is less demand for lower order job skills and a much greater demand for new 21st Century competencies and skills. This affects all types of workers from office secretaries to company presidents, from car mechanics to car manufacturers.



In education, this has generated a new focus in pedagogical processes where there is a balance between teaching students the core content knowledge *and* the ability of students to apply that knowledge to the competencies that support student learning. In other words, these competencies differ from traditional educational outcomes because they value not only mastering a discrete concept or memorizing a particular formula but also on practically applying what is learned across subject matters and in a variety of settings. Under a competency approach, students demonstrate that they are able to use what they learn in different educational subjects or occupational areas to solve meaningful tasks and challenges.

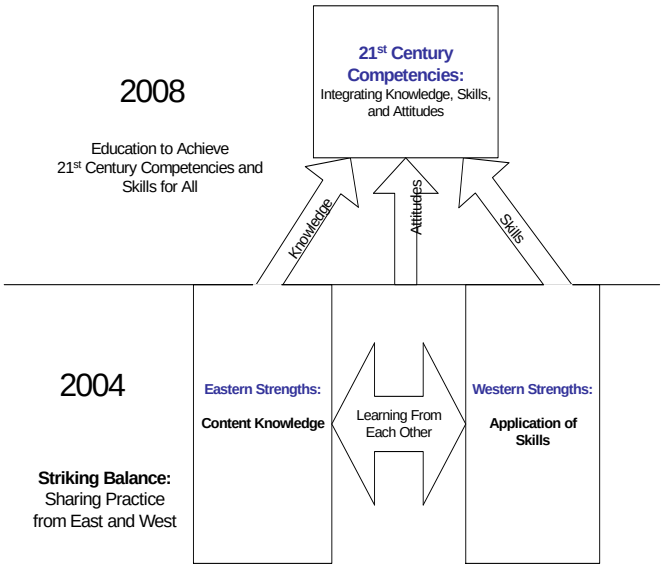
In preparation for the 4th APEC Education Ministerial Meeting (AEMM), Peru surveyed Member Economies and found that the Economies responding to a survey on 21st Century competencies recognized a need *"to go beyond the teaching/learning approach which is solely based on*

knowledge acquisition." When probed further, many APEC Member Economies identified four overarching competencies: life long learning, problem solving, self-management, and teamwork that correspond to those identified as essential by UNESCO's Commission on Education in the 21st Century. The Commission highlights the need for students across the world to be learning to know, learning to be, learning to learn, and learning to live together.

II. Recommended EDNET Priority Areas

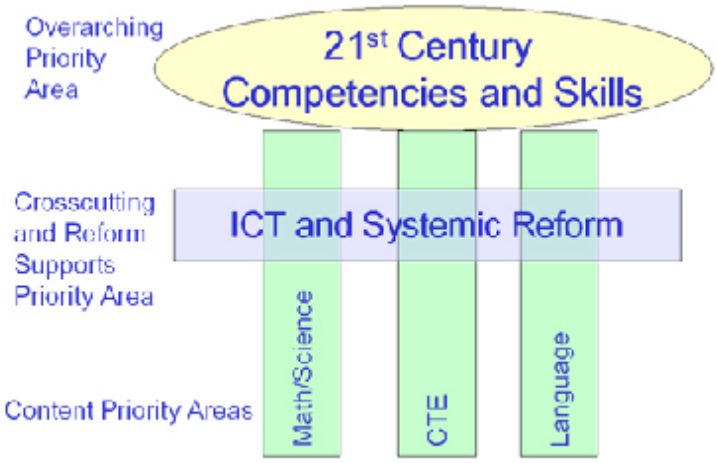
To develop an EDNET agenda around preparing students for the 21st century workforce, the 2nd APEC Symposium on Education Reform entitled, "*Education to Achieve 21st Competencies and Skills for All: Respecting the Past to Move Toward the Future*," was held January 15-17, 2008. The purposes of the symposium were to prepare the content and an agenda for the 4th APEC Education Ministerial Meeting (AEMM) to be held in Lima, Peru, in June 2008 with the theme of 21st Century Competencies for All. Participants from eighteen Economies attended the Symposium. They represented researchers, government officials, and members from the private sector concerned with the students, workers, and managers of the 21st Century. The symposium focused on key 21st Century outcomes to be competitive in the global economy

The symposium built upon the content and themes of the 2004 Symposium. In 2004, EDNET examined the differing traditions and educational philosophies in Eastern and Western Economies. The focus was two-fold: effectively imparting content knowledge, at which Eastern systems have traditionally been strong, while at the same time promoting creativity and critical thinking skills, traditionally the strengths of the West's education systems. The 2008 Symposium recognized the fact that 21st Century workers need to go to a higher level and integrate knowledge, skills, and attitudes to attain 21st Century competencies (see the Figure below).



The Symposium Framework focused on four priority areas as they relate to the overall theme of 21st Century Competencies and Skills:

Coming out of the Xi'an Symposium, APEC Member Economies recommend building on the Symposium priority areas and focusing on providing students in the APEC region with the competencies -- knowledge, skills and attitudes -- relevant to function in a 21st Century global economy.



- **Mathematics and science.** Mathematics and science can no longer be viewed as subject relevant only to scientists and engineers. Mastering mathematical and scientific principles is essential to navigating the data-driven and technological world of the 21st century, no matter one's industry.

- **Career and Technical Education (CTE).** Training supplemented by real-world application will become more and more vital as the workforce is constantly adapting to new technological innovations and workers transition to multiple jobs over a lifetime.

- **Learning each others' languages.** Because we now live in a global economy, being able to speak others' languages and communicate in culturally sensitive ways is essential to trade and to other forms of international exchange.

- **Information communication technologies (ICT) and systemic reform are crosscutting topics that support the content priority areas.** Effective implementation of ICT and systemic reform are necessary for ensuring a 21st Century education.

    - **Technology** must fundamentally be integrated into classroom instruction, performance measurement, and accountability systems just as it has been integrated into every other facet of modern life and exerting basic changes in how we live individually and in social networks.

    - **Systemic reforms** must be adopted as education systems work to level the field for all students to receive the requisite standards and assessments, teachers and instruction, resources, and tools.

III. Project Framework to Develop APEC Activities in the Four Sub-themes

APEC Economies agree that the different elements of the education systems in the APEC region need to be re-examined, priorities reevaluated, and resources reallocated to support students achieving the identified 21st Century competencies and core content knowledge in the 21st Century priority areas (mathematics and science; career and technical education; learning each other's languages and ICT and systemic reform). APEC projects can help guide Economies' in reexamining their education systems in the 21st Century priority areas by identifying projects in the following systemic topics:

- **Standards and assessments**. Standards should identify what students ought to know in core content areas *and* ensure that students are demonstrating the development of 21st Century competencies over time. Open-ended assessment items that measure content mastery and the application of knowledge learned to real world contexts through problem solving should be incorporated.

- **Teachers and instruction**. Teacher recruitment, preparation, certification and ongoing professional development should include instruction on how to embed opportunities for students to develop 21st Century competencies in the core curriculum. Teachers should also be trained to implement and capitalize on ICT solutions that will, in the long term, facilitate systemic reform.

- **Policies and Research.** Research on the knowledge, skills, attitudes and values most highly correlated with student success in the 21st Century economy should inform Member Economies' domestic policies related to standards, assessment, teacher quality and instruction, and inform the direction of EDNET projects.

- **Resources and Tools.** ICT, in particular, provides the opportunity for teachers and students to gain access to expanded knowledge, personalized instruction, and learn by "doing" through on-line simulations. Virtual and on-line exchanges are also useful for building learning communities and share best practices.

IV. Building Strategic Action Plans in the Priority Areas

Ambassador Juan Carlos Capuñay, Executive Director of APEC, charged Member Economies at the closing session of the Xi'an Symposium to develop strategic action plans in an effort to better convey the group's recommendations to Ministers in the priority areas of math and science, CTE, language learning, and ICT and systemic reform. It had been noted during the Symposium that project recommendations made at the 3rd APEC Education Ministerial Meeting in Santiago heavily emphasized research projects for which there is no capacity in APEC and, therefore, these project recommendations were largely ignored.

With the Executive Director's wisdom and advice in mind, the Priority Area Leaders met and developed realistic and feasible action items for potential EDNET projects. With the APEC Executive Director's leadership, Priority Area Leaders were advised to develop recommendations that were value-added and that could be implemented within the APEC project structure in a successful manner. One major, cross-cutting area of emphasis acknowledged at the Symposium was the need for shared strategies to meet the challenges of *teacher quality, development, and recruitment.*

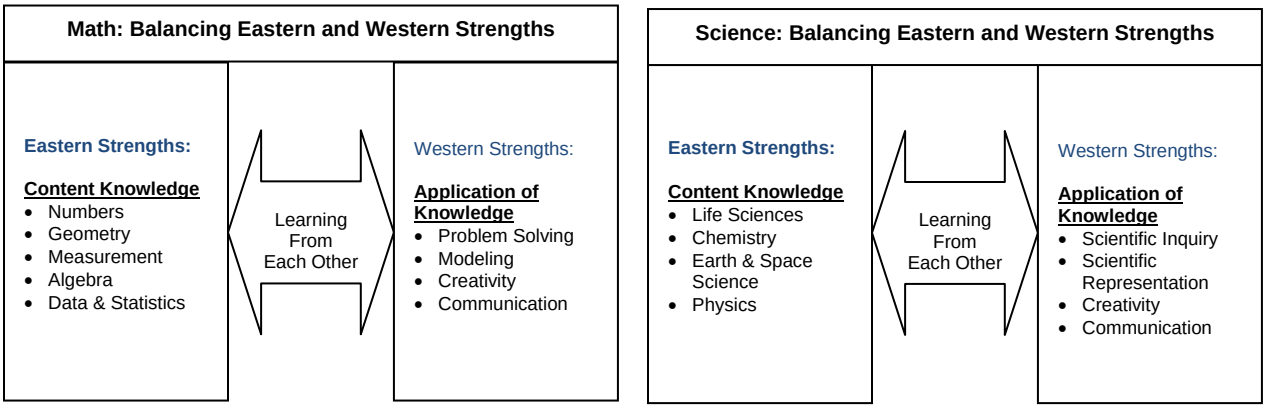
This paper lays out for APEC Education Ministers an action agenda in the four EDNET priority areas over the next two to four years for their discussion and approval. Decisions made within APEC are reached by consensus and commitments are undertaken on a voluntary basis. APEC is the only inter governmental grouping in the world operating on the basis of non-binding commitments, open dialogue and equal respect for the views of all participants.

The recommended project activities that will comprise the Strategic Action Plans in the four priority areas follow.

MATHEMATICS AND SCIENCE

Facility with mathematics and science is key to success in a global economy driven by technological development and the use of information and data. Proficiency in mathematics and science are becoming prerequisites for success in any industry. Increasingly, students must master both routine and more complex 21st Century skills.

However, international comparison studies have found significantly different levels of achievement and practice in science and math education in the East and West . In general, the Asian educational systems seem to excel in producing students with a strong grasp of core mathematics and science content knowledge and include some of the highest scoring economies on the Third International Mathematics and Science Study (TIMSS). The Western systems have other strengths; they are successful in helping students develop problem-solving skills and the ability to apply knowledge to real life situations to build 21st Century competencies. Hence, the Eastern curricula tend to be more content-based while the Western curricula is more process based. The pressing issue is how to combine the best of both systems (see Figures below).



The mathematics and science subgroup convened at the Xi'an Symposium suggested projects that will facilitate the inclusion of 21st Century skills into mathematics and science standards, assessments, curriculum and content delivery.

Standards and Assessments

Activities leading up to and presented at the Xi'an Symposium by the Priority Area Leaders of Japan and the United States focused on content standards and assessment in mathematics and science. They collected and compared the similarities and differences of translated math and science standards of several high performing APEC Economies on international assessments (PISA and TIMSS) with one another. These data are also useful for other Economies to use to benchmark their own standards against.

Assessment questions with the level of difficulty indicated by the percent of students providing correct answers were also illustrated at the Symposium. Results from the Math and Science

Policy Survey showed that Economies have a broad interest in an assessment item bank in which respondents would deposit earlier versions of their assessments or individual assessment items (that would be translated into English). Most respondents have the capacity to provide assessment questions.

To continue project work in math and science standards and assessment, the Math and Science Priority Area Subgroup recommends:

- **Continuing to translate and analyze mathematics and science standards** with a focus on the sequence in which mathematical and science topics are introduced.

- **Developing a bank of mathematics and science test items** identified by difficulty level and grade level. In the future, complete assessments could be uploaded and special attention given to assessments that measure both content knowledge mastery and the development of 21st Century skills.

Teacher Quality and Instruction

Today's economy is imposing new requirements on APEC Members' education systems. Nothing is more striking than the need to provide mathematics and science *for all* students so that they can find good jobs in the 21st Century global economy. How this instruction is provided and who provides the instruction is fundamental to student success. First and foremost, teachers need a deep understanding of math and science content and effective pedagogy so that they can describe what they know and see and can coach students into solving real-world problems in these topics.

Clues into how content is delivered in the high performing APEC Economies was provided through an analysis of the math and science standards. This analysis illuminated the differences in the sequencing of instructional topics. The Math and Science Policy Survey found that responding economies employ different teaching approaches, although the differences and similarities between approaches is not well known and could be further explored:

- *Exclusive Sequential Approach* (in which each branch is taught in sequence, typically in consecutive semesters or years)
- *Parallel Approach* (where multiple subjects are taught in parallel, but as distinct disciplines often with distinct teachers).
- *Integrated Approach* (where the boundaries among disciplines are broken).

Teacher quality is ultimately about whether teachers are able to instruct students to learn and apply mathematics and science within a 21st Century knowledge base.
To this end, according to the Math and Science Policy Survey, some APEC Economies employ special policies during the in-service training of mathematics and science teachers, while others do not. Such policies include intensive multi-week summer training, technical training opportunities in the private sector or universities, on-line training, and sabbaticals. One important approach with longstanding evidence of success is the lesson study method of developing and critiquing lessons before peers. The importance of ICT delivery modes for effective teacher

professional development was illustrated to Symposium participants through online professional development programs using simulations and lesson study videos available on the HRDWG wiki.

To continue project work on math and science teacher quality and instruction, the Math and Science Priority Area Subgroup recommends**:**

- **Evaluating different mathematics and science instructional approaches** (e.g. parallel, sequential, integrated) by comparing advantages and disadvantages.

- **Encouraging the expanded use of the lesson-study approach/method through on-line demonstrations, videos and a training guide to using the online materials**. Lessons should illustrate well-researched teacher practices and provide insight into how the lesson study process can further improve teacher practice.

- **Launching multiyear collaborative online professional development, including building on open content** that is produced by reputable research institutions and math-science associations.

- **Examining how to improve math-science connections** through research syntheses, discussion of practice, and APEC conferences.

Policies and Research

One of the major benefits of APEC is the coming together of Economy Members and sharing information and best practices on policies and research. This was best illustrated by the information sharing that has taken place during the 1st and 2nd APEC Symposiums on Education Reform held in Beijing in 2004 and Xi'an in 2008. These venues have afforded policymakers, researchers, and members from the private sector the opportunity to come together and identify opportunities for implementing research findings into domestic policies and agreeing on areas needing further investigation by both research universities throughout the APEC region and government.

To continue project work on math and science policy and research, the Math and Science Priority Area Subgroup recommends**:**

- **Conducting case studies into lessons learned about how and why APEC economies change policy directions in** mathematics and science including revising standards and coursetaking requirements.

- **Evaluating course requirements and assessments required for upper secondary school graduation or college admissions as a mechanism for ensuring adequate preparation for 21st Century competencies.**

Resources and Tools

The need for resources and tools in sharing information and best practices in each of the systemic education elements of standards and assessment, teacher quality and instruction, and policymaking and research was apparent to the math and science subgroup.

The Math and Science Priority Area Subgroup, therefore, recommends:

- **Using the HRDWG wiki as a tool for on-going APEC international collaboration** and debate to strengthen mathematics and science education. This includes making available standards, assessments and lesson study videos in a collaborative and interactive Wiki environment.

Career and Technical Education/Technical and Vocational Education Training

During the Xi'an Symposium, China and the Philippines proposed the CTE(Career and Technical Education) should be one of priority areas. China and the Philippines will be co-leaders. The following is the brief description of how to build strategic Action Plan in CTE priority area:

- ## Background

With the fast growth of the knowledge-based economy, 21st Century employees need relevant competencies to respond to the demands of the workplace. While Career and Technical Education (CTE)/Technical and Vocational Education Training (TVET) is a new area for EDNET, it is at the very core of the APEC mission. CTE/TVET is beneficial for economic development, especially youth development. High-quality CTE/TVET can help students gain 21st Century competencies, skills, and required qualifications in settings that are often highly flexible, affordable and focus on the practical application of what is learned.

CTE/TVET in the 21st Century must recognize the importance of meeting demand driven private sector workplace requirements. Today's workplace requires a higher level of content, technical skills, and mastery of 21st Century competencies and skills from all its employees. This is a shift from the past when higher-level skills were for a minority of workers. Quality CTE/TVET programs integrate academic and technical skills to meet 21st Century, industry-based occupational standards. However, in many APEC Economies, the public image of CTE/TVET is much lower than the traditional academic sequence.

The Policy Survey for CTE/TVET undertaken by China and the Philippines showed that there are very real transition issues as students move from the school to work environment, especially in the areas of 21st Century competencies that an employer values. In addition, students from differing Economies enter into CTE/TVET programs at different ages. The required number of years required to obtain CTE/TVET credentials varies among survey respondents.

No matter the economies or the mode of CTE/TVET, training supplemented by real-world application will become more and more vital as the workforce is constantly adapting to new technological innovations and workers transition to multiple jobs over a lifetime.

Common Concerns in CTE Area

In the Xi'an EDNET Symposium, "Education to Achieve 21st Century Competencies and Skills for All," participants from 12 APEC Economies (Australia, Brunei, China, Hong Kong, Japan, Korea, Mexico, New Zealand, Philippines, Chinese Taipei, Thailand, USA) discussed CTE-related issues relevant to APEC EDNET in a separate breakout session. The most common concerns were:

(1) The portability of skills and qualifications within APEC for mobility

(2) The involvement of industry in defining competencies, curriculum, and assessment

(3) The enhancement of curriculum development, teacher training, and public image to elevate the status of CTE/TVET

The following topics were discussed:

- Establishing a common understanding for the different definitions of the terms CTE and TVET.

- Understanding and acknowledging the different challenges and approaches in economies' CTE/TVET systems.
- Compiling, analyzing, and sharing information about each Economy's education system and methods for comparing and recognizing qualifications.
- Integrating industry (employers, industry groups, service sector, etc.) in:
    a. Defining the competencies required in the workplace
    b. Developing curriculum
    c. Developing assessments

Standards and Assessment

Through the sharing of the standards, APEC workers can be trained to higher levels, thus facilitating trade and business facilitation. We could do:

- **Comparing CTE frameworks across Economies.** learning about effective practices to integrate academics with vocational training to ensure appropriate workplace preparation and to elevate the prestige of CTE training in APEC Economies.

Teacher Quality and Instruction

In the CTE/TVET Policy Survey, China and the Philippines found that virtually all Economies (90 percent) place great importance on the pre-service and in-service training of teachers. However, issues regarding the quality of CTE/TVET instructors' education and professional development need to be explored more. We could do:

- **Identifying effective strategies for improving teacher training programs for CTE instructors** with up-to-date resources and tools.
- **Sharing evidenced-based practices for effectively involving employers, industry groups and the service sector in developing curriculum.**
- **Strengthening CTE development of curriculum**, especially through means such as on-line training programs available to APEC members.

Policies and Research

Based on the CTE/TVET Policy Survey results, China and the Philippines presented recommendations on future research topics, including comparative analyses of curriculum standards, CTE/TVET policy, and encouraging women to engage in non-traditional career paths. We also suggested a forum to share information on meeting market demands, industry involvement in curriculum reform, and teacher training.

Overall, the CTE/TVET Subgroup expressed the importance of collaborating on CTE issues in the APEC region. We could do:

- **Sharing good practices on involving employers, industry groups, and the service sector in drafting policy** related to competencies, curriculum, and assessments.
- **Undertaking analyses in one or more vocational sectors that compare CTE/TVET skills and qualifications** in order to create common benchmarks in the sectors.

Resources and Tools

As a new area for EDNET, the need for sharing information and leveraging existing CTE/TVET resources and tools in the APEC region was recognized. We should Identify existing resources and tools by utilizing the HRDWG wiki to create linkages with other APEC fora.

In CTE area, the recommended project activities should comprise the above framework.The above lays out for APEC Eduction Ministers an action agenda in the CTE EDNET priority area over the next two to four years for their discussion and approval.

LEARNING EACH OTHER'S LANGUAGES

The learning of English and other languages is the key to enabling young people to develop the communicative and intercultural competencies and skills needed to participate effectively in the 21st century global community. The ability to communicate across language barriers is essential to international trade and to building mutual understanding among interconnected global economies. All APEC members are faced with the issue of how to effectively prepare multi-lingual citizens who can appreciate the culture of and communicate with speakers of other languages. In many APEC member economies, second or third language learning has historically occupied an important place in the school curriculum.

Because of the primacy of English in diplomacy and trade today, many APEC members from Eastern economies have further stressed English language education, extended this to the early elementary grades, and raised their expectations for proficiency. English speaking economies, on the other hand, find it hard to motivate their students to take a second language in high school and to find teachers qualified to teach a language other than English.

Chinese Taipei and Chile have been the leaders in APEC EDNET's work in the learning of each other's languages since 2004, focusing on standards and assessment and establishing a strong evidence base for future work. The Language Learning Subgroup focused their recommendations on three areas: developing APEC standards in English and other languages, pursuing lesson study activities for teacher professional development in language learning, and studying language policies of the Member Economies.

In developing 21st century competencies and skills for all, the Priority Area Leaders believe that building teacher capacity, as emphasized by ICT & Systemic Reform Priority Area, should be emphasized when considering projects (see Figure below). As learners in many economies are not living or working in environments where they are exposed to English or languages other than English that they may be learning, it is even more important that the quality of teaching be emphasized and that good teaching be highly esteemed. Students can be exposed to a wide variety of language input via media and the Internet. Applying critical thinking to what they hear and see and learning to produce comprehensible language requires keen guidance from teachers. For that reason, building teacher quality is key in this priory area.

The cross-cutting theme of ICT and Systemic Reform applies to the Language Learning Priority Area as all governments are concerned about efficient and effective use of resources. Judicious application of ICT to language teaching/learning is one means of spreading precious resources further. ICT also provides access to authentic language materials and enables relatively easy interaction with native speakers of the target language. Systemic reform emphasizes the importance of documenting and measuring outcomes as a result of our interventions. Four years from now, education leaders will be asked: "Can more learners in the Member Economies actually use another language competently for diplomacy or trade than they could before we began these projects?"

Standards and Assessments

The policy survey from the *Seminar on Standards for English and Other Foreign Languages in APEC Economies,* an EDNET project hosted by Chinese Taipei and Chile in December of 2007, showed an increase in the use of national and local performance standards/assessment systems from 83% of respondents in 2003 to 93% or respondents in 2007. In addition to the policy survey, attendees at the seminar produced recommendations for future APEC projects. These recommendations included further exploration of assessments and frameworks for language standards in APEC and are reflected in the project recommendations below.

To continue project work on learning each other's language in the standards and assessment area, the Language Learning Priority Area Subgroup recommends**:**

- **Conducting a suitability study of how existing standards and assessments including the Common European Framework of Reference (CEFR) and the American Council on the Teaching of Foreign Languages (ACTFL) standards** can best be used as an APEC language model, particularly expanding the lower levels to meet the needs of the learners in this region.

Teacher Quality and Instruction

The policy survey from the December 2007 *Seminar on Standards for English and Other Foreign Languages in APEC Economies* showed that more than half of all respondents deliver professional development and training for teachers in each of the following methods: teaching networks, training courses, mentoring, and e-learning. However, members of the language learning subgroup were intrigued by the work of the math and science subgroup in the area of professional development for teachers using a lesson study approach. They then chose to focus their professional development recommendations only in developing lesson study for learning each other's languages.

To continue project work on learning each other's language in the teacher quality and instruction area, the Language Learning Priority Area Subgroup recommends:

- **Encouraging the use of the lesson-study approach/method through on-line demonstrations and videos**. Lessons should illustrate well-researched teacher practices

and provide insight into how the lesson study process can further improve teacher practice.

Policies and Research

In the Xi'an Symposium presentation on the policy trends globally, it was recognized that language policies have evolved in response to globalization and local/regional concerns like national security threats, economic competition, and new research on standards and values (e.g., 21st century competencies for all). All Economies need strategies for establishing and implementing second language policies, although there is a widespread acceptance of the need for high-level communicative and intercultural competencies. Many economies are teaching English at younger ages and they are using English for content instruction.

There is also work beginning on better aligning assessment practices with standards. However, ongoing attention must be paid to second language teachers' language and culture proficiency standards and assessments. Though most language programs envisage cultural understanding and positive cross-cultural attitudes as primary goals, research demonstrates that language learning of itself does not lead to improved attitudes but rather a combination of methodological and course design features is necessary. And while language education policies, syllabuses and teachers themselves almost universally identify the attainment of language proficiency and the enhancement of cross-cultural and intercultural attitudes as two of the central goals of second or foreign language education. However, examination of their methodology and the teaching outcomes suggests that, in practice, the reality may be quite different. (Ingram, 2007). Ingram also quoted Peter Cosgrove (2002), then Australian Chief of Army from an address to the Australian Principals Association Professional Development Council, Melbourne.

> *Our future prosperity and security will depend on our ability to understand* .. [other] *cultures and to build bridges to the citizens of* .. [other] *nations* …
> *…Commercial links, alone, will never render war unthinkable. What will, however, are mutual understanding and respect and the banishing of prejudice.* …
> *…If the future is to be one of peace and prosperity our kids will need the capacity to engage in a dialogue with others of different cultures and creeds.*

To continue project work on learning each other's language in the policy and research area, the Language Learning Priority Area Subgroup recommends:

- **Conducting a survey of Member Economies' policies** regarding multilingualism and multiculturalism.

Resources and Tools

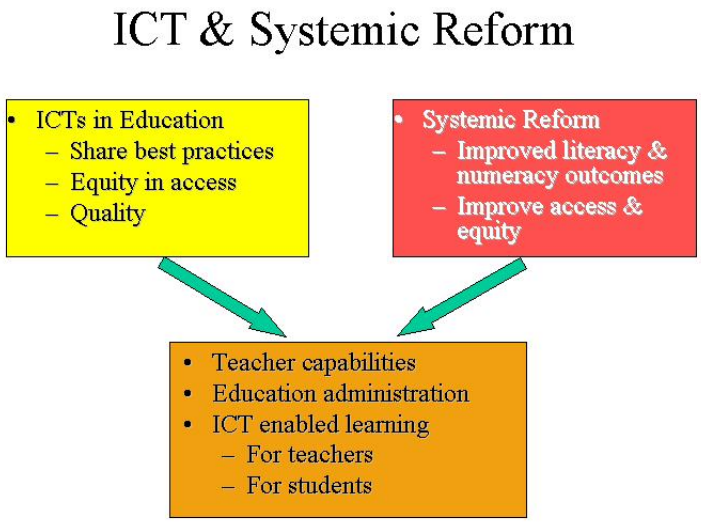
During the Symposium, the HRDWG Lead Shepherd presented initiatives being undertaken under the APEC project *Strategic Plan for English and other Languages in the APEC Region.* **In order to build on this work already being undertaken by APEC, the Language Area Subgroup recommends:**

- **Contributing to and helping publicize a consumer checklist** for APEC language learners to use to evaluate language learning programs
- **Contributing to and publicizing an inventory of existing teacher and student exchange programs** by APEC members
- **Publicizing APEC e-learning programs** including Chengo, OLLI, and the APEC Business English program

INFORMATION COMMUNICATION TECHNOLOGIES (ICT) AND SYSTEMIC REFORM

"Achieving 21st Century Competencies and Skills for All" is a goal that has profound implications for all education systems across the APEC region. However, ensuring 21st Century Competencies and Skills for All may mean different things for developing and developed economies in the APEC region. Success in delivering the necessary skills and competencies will be a major factor contributing to each economy's national productivity and participation, individual prosperity and economic security, civic participation, equity and social cohesion. Education Ministers are faced with the challenges of ensuring the supply and quality of education services relevant to the needs of their particular economy, including ensuring their national education systems are sufficiently flexible and responsive to deliver the skills and competencies required for 21st century social and workforce participation

Since Governance and Systemic Reform was established as a priority area at the 3rd AEMM in Santiago in 2004, there has been considerable interest and activity in relation to this theme. Four projects have been completed and two are underway. Likewise, there are 18 education projects that either use ICT or are focused ICT. [1] ICT and Systemic Reform are the twin cross-cutting themes that apply across education systems. (Figure 1).



The need for highly responsive and flexible education systems indicates a need for ongoing systemic reform. Systemic reform can focus on many elements of education systems: in the AEMM context, this sub-theme of systemic reform can be seen as ensuring that outcomes in the other three priority areas - math and science, language learning, and career and technical education – are delivered effectively and efficiently.

[1] Choi, S. W. Kim, Y, H, and Others. (2008). A Strategic Study of ICT Roles in Systemic Reform for Development of 21st century Human Power in APEC Community. Korean MOE&HRD.

Efforts to reform education systemically are greatly facilitated by the introduction of information communication technologies (ICTs) that enable more efficient use of information. These technologies can enable better tracking of student and teacher progress, greater ease in using data to inform instruction and access to online professional development for teachers and technology-based learning for students. Further, ICT can facilitate international relationship building and collaboration among education professionals and also among students who learn other languages and develop cultural sensitivities through these interactions.

Teacher Quality and Instruction

Delegates from APEC economies put forward critical issues facing their education systems when they met in Xi'an. First, all Economies believe there are benefits in sharing approaches to the challenges of attracting and retaining sufficient high quality teachers, and ensuring that teacher training and ongoing education improves outcomes for all students. This was seen as a key cross-cutting issue across the other three priority areas. A key area of concern for many APEC economies is that shifts in labour market demands, opportunities and demographics may cause a global shortage of qualified teachers at the same time that existing teacher populations need to be retrained in order to effectively teach and use new technologies, as well as impart 21st century skills and competencies.

Useful research to the problem of recruiting and retaining high quality teachers includes that of McKinsey & Company (2007), How the World's Best-Performing Systems Come Out on Top. This research identified the characteristics common to the world's best performing systems, including:

- an average academic calibre of teaching applicants within the top 10 percent of age cohort;
- teaching as one of the top three career choices among university applicants;
- rigorous graduate selection processes, including testing of literacy and numeracy;
- ratios of 1:10 applicants selected to enter teaching degrees; and
- starting salaries in line with other graduate salaries and living standards.

In addition to attracting the right applicants, top-performing systems also focus on developing applicants into effective instructors. Some of the characteristics identified by McKinsey, include:

- a minimum 20 weeks' practical coaching in schools during degree;
- 10% of working time devoted to professional development;
- regular structured feedback providing teachers with exact knowledge of weaknesses in their practice;
- teachers invited to each others' classes to observe, learn and coach best practice;
- the best coaches and instructors are selected as school leaders; and
- research into effective instruction. [2]

Further research from Australia (Commonwealth of Australia, 2003, Australia's Teachers: Australia's Future - Advancing Innovation, Science, Technology and Mathematics) indicates that strategies to retain high quality teachers include:

- sustained improvements to the working conditions of teachers;
- effective induction programs and mentoring support for beginning teachers;

[2] http://www.mckinsey.com/clientservice/socialsector/resources/pdf/Worlds_School_Systems_Final.pdf

- curriculum and pedagogy which engages students;
- articulated professional standards, flexible workplaces and enhanced career pathways;
- ongoing opportunities for professional learning; and
- strong school based leadership and team practices.

It found that, progressively, teaching career and salary advancement should come to be based on merit and teaching performance rather than length of service, with accomplished teachers rewarded at higher rates.[3]

All APEC economies need teachers who can contribute to the development of 21st century skills (flexibility, problem solving, creativity, critical thinking skills, self-directed learning, motivation, self-reliance and communication skills). The challenges relate to how this focus on 21st century skills can be embedded into all stages of the teaching lifecycle. A range of research has found that the quality of the teacher is the most important in-school determinant in raising student achievement. Australian research, *Teachers for the Future: the changing nature of society and related issues for the teaching workforce (*Skilbeck, M & Connell, H, 2004) has found that while effective student learning will always be the focus of successful teaching, the nature of what is to be learnt, the best ways of learning and the needs of students are continually evolving. Teachers and school leaders need to be able to frame their professional work in a broader context than the immediacies of the single classroom, and to understand that they are key agents in enabling students to create or make the future. Teachers are the key to mobilising schools for innovation, working with families, business and the wider community. [4]

To continue project work on teacher quality and instruction, the ICT and Systemic Reform Priority Area Subgroup recommends:

- **Exploring opportunities for teacher exchanges** among economies;
- **Sharing innovative approaches to teacher recruitment and development**, including in the use of ICT;
- **Sharing best practices on teacher incentives such as scholarships and career flexibility/part-time teaching** by professionals in specialist areas.

Policies and Research

APEC economies have made massive achievements over recent decades in national education performance regarding literacy and numeracy, levels of education achieved, quality, national capacity etc. However, member economies continue to face the challenges of ensuring the benefits of education for *all students*, especially groups disadvantaged for reasons of location (rural and remote), history or membership of an indigenous or ethnic group, language, and socio-economic background. In addition, while all economies share the challenges of ensuring that the

[3] http://www.dest.gov.au/sectors/school_education/policy_initiatives_reviews/reviews/teaching_teacher_education/

[4] http://www.curriculum.edu.au/verve/_resources/teachersforthefuture_file.pdf

opportunities available through a high quality education are extended to all members of their society, all economies face the issue of reducing the digital chasm within and across their boundaries.

Targeted programmes have been found to be effective in improving learning outcomes, including concentrated efforts in early childhood education, engaging community and parental involvement, enabling access by remote communities to library services, home to school transition, transition from primary to secondary, using ICT, arts and sports education, leadership by principals and other key players, selection of teachers, vocational education in schools and colleges, broader public policy measures including income support, values education and programmes to address interfaith and intercultural issues in a school environment.

The OECD has identified elements of education systems successful at addressing disadvantage. These include school governance (balance of school autonomy and accountability to external standards), individualised learning, teacher responsibility for student success linked to diagnostics through the year, ambition to achieve more highly, school-based time outside the classroom, etc.

International exchange of education is a key driver of innovation in APEC economies. Education exchange occurs at multiple levels – between governments, institutions, teachers, academics, researchers and students. Exchange in education- the movement of students, institutions, policies and practices between economies - is an important component of the cooperation that defines APEC, and its endeavours to improve, through cooperation, economic outcomes among member economies.

Some systemic reform projects have sought to promote capacity in quality assurance, educational assessment, evaluation, qualifications frameworks and regulatory frameworks. In particular the sharing of information for regional understanding on quality assurance and qualifications recognition will continue. The CTE/VET sub-theme focus on qualifications comparability is an example of this need.

Global mobility of students, academics and graduates is continuing to grow in the APEC region, with more economies involved in this mobility as both senders and destinations. Mobility of students, graduates and researchers is an area where APEC could work collaboratively with other multilateral organisations. EDNET could share information with UNESCO on qualifications recognition and quality assurance; and with the Asia-Pacific Quality Network (APQN) on quality assurance. The ILO is working on skills in relation to the mobility of skilled labour, the latter being relevant to the overarching Human Resources Development Working Group.

To continue project work on ICT and Systemic Reform policies and research, the ICT and Systemic Reform Priority Area Subgroup recommends:

- **Sharing best practices on the development of self-sustaining mechanisms** for ICT implementation, (e.g. hardware maintenance & avoiding obsolescence).

- **Adopt an open access approach (e.g., creative commons licensing)** for resource sharing to address intellectual property rights issues.

- **Share successful approaches to overcoming educational disadvantage** and in particular the role of targeted programs for early childhood education and ICT.

Resources and Tools

Current technological developments indicate that the new Web 2.0 technology makes it easier to share resources and collaborate. The need for resources and tools in sharing information and best practices in each of the systemic education elements of standards and assessment, teacher quality and instruction, and policymaking and research is great. That is why a controlled, wiki environment limited to APEC members has been promoted by the APEC Lead Shepherd. Nevertheless, it is important to note that the new technology itself does not guarantee immediate sharing and collaboration among the member economies. However, carefully done, it can move EDNET towards collaboration for shared prosperity.

GLOSSARY OF TERMS

1. **21st Century Competencies:** the knowledge, skills and attitudes necessary for the rising generation to be competitive in the 21st century workforce.

2. **American Council on the Teaching of Foreign Languages (ACTFL):** a U.S.-based organization dedicated to the improvement and expansion of the teaching and learning of all languages at all levels of instruction throughout the United States.

3. **APEC Education Ministerial Meeting (AEMM):** an annual APEC meeting attended by the chief education officers of each Member Economy. This year's Education Ministerial Meeting will be the 4th of its kind and will take place in Lima, Peru in June 2008.

4. **APEC Education Reform Symposium:** an annual EDNET meeting held to discuss the agenda for the annual APEC Education Ministerial Meeting. In 2008, it was co-sponsored by the Chinese and Peruvian ministries of education and the U.S. Department of Education. Held in Xi'an, China, it addressed the theme: *Education to Achieve 21st Century Competencies and Skills for All: Respecting the Past to Move toward the Future*.

5. **The Association for Career and Technical Education (ACTE):** founded in 1926, ACTE is the largest national education association dedicated to the advancement of education that prepares youth and adults for successful careers. ACTE's goals are to increase public awareness and appreciation for career and technical programs and assure growth in local, state and federal funding for these programs by communicating and working with legislators and government leaders.

6. **Career and Technical Education (CTE):** a term used to describe the study of a vocation such as agriculture; trade and industrial; business and marketing; family and consumer sciences; health occupations; public safety and security and technology. These fields may require varying levels of education – from high school and postsecondary certificates to two- and four-year college degrees. *Also referred to as technical and vocational education and training (TVET).*

7. **Chengo:** a multi-media Chinese and English language learning system originating from a 2002 bilateral Memorandum of Understanding signed between the U.S. Department of Education and the Chinese Ministry of Education. It provides advanced speech recognition, handwriting recognition technology and an intelligent feedback system to help American students learn Chinese and Chinese students learn English.

8. **Common European Framework of Reference (CEFR):** a document that provides a practical tool for setting clear standards to be attained at successive stages of language learning and for evaluating outcomes in an internationally comparable manner. It provides a basis for the mutual recognition of language qualifications, thus facilitating

educational and occupational mobility and is increasingly used in the reform of national curricula and by international consortia for the comparison of language certificates.

9. **Education Network (EDNET):** APEC's Education Forum, led by APEC's Human Resources Development Working Group, that works to coordinate joint activities in the field of education across Member Economies.

10. **Exclusive Sequential Approach**: an instructional approach that involves teaching each branch of the curriculum in sequence, typically in consecutive semesters or years**.**

11. **Human Resources Development Work Group (HRDWG):** an APEC workgroup that supports human resource development in the Pacific Rim through its Capacity Building Network (CBN), Education Network (EDNET) and Labor and Social Protection Network (LSPN).

12. **Informal learning**: unstructured learning that, in most cases, takes place outside professional or educational institutions and is not accredited.

13. **Information communication technologies (ICTs):** the building blocks of the networked world, including telecommunications technologies such telephony, cable, satellite and radio, as well as digital technologies, such as computers, information networks and software.

14. **Integrated Approach**: an instructional approach characterized by the blurring of boundaries between the various disciplines.

15. **L2 Teaching/Learning Theory:** Second Language Teaching/Learning Theory.

16. **Language Teachers' Knowledge and Skills:** the authors assert that language teachers should be equipped with the following: 1) applied linguistic knowledge; 2) contextual knowledge; 3) cultural knowledge and experience; 3) second language acquisition (SLA) knowledge; 4) excellent communication/interaction skills; 5) teaching knowledge of L2 teaching/learning theory; 6) other personal attributes such as empathy, vision, etc. and 7) experience as a language learner and a language teacher.

17. **Lesson Study:** the foremost form of professional development in Japan, it involves peer observation and feedback and has been credited with improving classroom practice within the Japanese elementary school system. APEC's Education Network is currently conducting a project, Classroom Innovations through Lesson Study, which explores the use of lesson study in the teaching of mathematics.

18. **Math and Science Survey:** a survey distributed to the APEC Member Economies regarding their math and science policies and practices.

19. **Non-formal learning:** the result of organized action, it takes place within or outside work and is not accredited.

20. **Open Language Learning Initiative (OLLI)**: a game-based language learning system that takes users across the United States virtually to learn about American culture, democracy and diversity while applying their English-speaking skills.

21. **Parallel Approach**: an instructional approach where multiple subjects are taught in parallel, but as distinct disciplines, often with distinct teachers.

22. **Programme for International Student Assessment (PISA):** an internationally standardized assessment that was jointly developed by participating countries and administered to15-year-olds in schools. The survey was implemented in 43 countries in the 1st assessment in 2000, in 41 countries in the 2nd assessment in 2003, in 57 countries in the 3rd assessment in 2006 and 62 countries have signed up to participate in the 4th assessment in 2009. Tests are typically administered to between 4,500 and 10,000 students in each country.

23. **Seminar on Standards for English and Other Foreign Languages in APEC Economies**: an EDNET project hosted by Chinese Taipei and Chile in December of 2007 that showed an increase in the use of national and local performance standards/assessment systems from 83% of respondents in 2003 to 93% of respondents in 2007.

24. **SLA:** Second Language Acquisition

25. **Technical and Vocational Education and Training CTE/(TVET):** a range of learning experiences which are relevant to the world of work and which may occur in a variety of learning contexts, including educational institutions and the workplace. This includes learning designed to develop the skills for practicing particular occupations, as well as learning designed to prepare for entry or re-entry into the world of work in general. (UNESCO-UNEVOC 2006: 15).

26. **Third International Mathematics and Science Study (TIMSS):** an international assessment that provides reliable and timely data on the mathematics and science achievement of U.S. students compared to that of students in other countries. TIMSS data has been collected in 1995, 1999, 2003, and 2007. TIMSS 2007 results will be released on December 9, 2008.

27. **Vocational Education and Training (VET):** comprises all organized or structured activities – whether or not they lead to a recognized qualification – which aim to provide people with knowledge, skills and competences that are necessary and sufficient in order to perform a job or a set of jobs (Descy, Tessaring 2001:7).

EDUCATION NETWORK (EDNET) STRATEGIC ACTION PLAN
2008 Theme and Priority Areas by Project[5]

Career and Technical Education

ECONOMY LEAD (Project Sponsor)	NAME OF THE PROJECT	PROJECT STATUS[6]	DESCRIPTION OF THE PROJECT	PROJECT METHODOLOGY	PROJECT TIMELINE
TEACHER QUALITY AND INSTRUCTION					
	Identifying effective strategies for improving teacher-training programs for CTE instructors with up-to-date resources and tools.	Recommended			
	Sharing evidenced-based practices for effectively involving employers, industry groups and the service sector in developing curriculum.	Recommended			
	Strengthening CTE development of curriculum, especially through means such as on-line training programs available to APEC members.	Recommended			

[5] Projects listed are either recommended projects or EDNET projects proposed during or after the APEC 2004 funding cycle

[6] Projects marked as "Recommended" are recommendations resulting from discussions and/or presentations from the Xi'an pre-Ministerial Symposium held in January of 2008. Projects marked as "Proposed" were proposed during the 30th HRDWG Meeting in Bohol, Philippines for the 2009 APEC Funding Cycle

STANDARDS AND ASSESSMENTS					
	Comparing CTE frameworks across Economies, learning about effective practices to integrate academics with vocational training to ensure appropriate workplace preparation and to elevate the prestige of CTE training in APEC Economies.	Recommended			
The Republic of the Philippines, People's Republic of China	Comparability and Benchmarking of Competencies and Qualification Frameworks in APEC Region (Pilot Area: Construction/Welding)	Proposed	The multi-phased project is aimed at achieving the following: •Compilation of Career and Technical Education/ Technical Vocational Education and Training (CTE/TVET) Systems of APEC Economies; •Inventory of Existing Qualification Framework of APEC Economies; •Comparability of competencies in the construction sector	Research Conference	2009/01/01-2012/12/31
POLICIES AND RESEARCH					
	Sharing good practices on involving employers, industry groups, and the service sector in drafting	Recommended			

	policy related to competencies, curriculum, and assessments.				
	Undertaking analyses in one or more vocational sectors that compare CTE/TVET skills and qualifications in order to create common benchmarks in the sectors.	Recommended			
Japan	Quest for the Link Between Schools and Employment	Proposed	This research project aims at drawing a set of practical policy recommendations on Technical and Vocational Education (TVE) at the secondary education level in the APEC region in order to contribute to the reduction of unemployment in young people and to sustainable and equitable economic development.	University implemented Survey Case Study	2009/03/01-2010/12/31
Indonesia	Study the responsiveness of the training system to market laborforce needs	Proposed			
RESOURCES AND TOOLS					
	Identify existing resources and tools by utilizing the HRDWG	Recommended			

	wiki to create linkages with other APEC fora.				

ECONOMY LEAD (Project Sponsor)	**NAME OF THE PROJECT**	**PROJECT STATUS**[7]	**DESCRIPTION OF THE PROJECT**	**PROJECT METHODOLOGY**	**PROJECT TIMELINE**[8]
TEACHER QUALITY AND INSTRUCTION					
	Exploring opportunities for teacher exchanges among economies	Recommended			
	Sharing innovative approaches to teacher recruitment and development, including in the use of ICT	Recommended			
	Sharing best practices on teacher incentives such as scholarships and career flexibility/part-time teaching by professionals in specialist areas	Recommended			
Malaysia	APEC Conference on Best Practices in School-based Action Research	Proposed	Action research is a process in which individual or several teachers collect evidence and make decisions about their own knowledge,	Conference Research	2009/01/01-2009/12/31

[7] Projects marked as "Recommended" are recommendations resulting from discussions and/or presentations from the Xi'an pre-Ministerial Symposium held in January of 2008. Projects marked as "Proposed" were proposed during the 30th HRDWG Meeting in Bohol, Philippines for the 2009 APEC Funding Cycle

[8] The project timeline indicates project timelines under APEC funding

			performance, beliefs, and effects in order to understand and improve them. This conference serves to illuminate best practices in teachers' approaches, theories, projects and activities which have yielded the desired results in improving quality education		
Korea	APEC Learning Community for Shared Prosperity	Ongoing	This project aims To construct and operate APEC Learning Community Builders (ALCoB) in order to bridge knowledge divide, enhance knowledge capacity and to promote human exchange - to organize the learning community that enables the exchange of the educational culture and information through Human Network among teachers, learners, supporters.	Conference Training	2003/08/01-2005/12/01 (still ongoing)
STANDARDS AND ASSESSMENTS					
POLICIES AND RESEARCH					
	Sharing best practices on the development of self-sustaining	Recommended			

	mechanisms for ICT implementation, (e.g. hardware maintenance & avoiding obsolescence).				
	Expanding ICT-enabled learning for students and teachers through APEC activities that support open access approaches (e.g. creative commons) for resource sharing to address intellectual property rights issues.	Recommended			
Korea	APEC Consortium for Future Education: Focusing on APEC Network of ICT Model Schools for Future Education	Ongoing	This project aims to: Create a network of ICT model schools in APEC region to share best practices and know-hows with other APEC members to reduce the digital divide. - Provide opportunities and means to exchange ideas, students, teachers, public administrators, and researchers among APEC member economies on the use of ICT in classrooms. - Disseminate information on best ICT practices, implementation policies, and research results through on-line, off-line, annual reports, and other formats of media.		2004/08/01-2006/12/01 (still ongoing)
Australia	Mapping of	Ongoing	The project will identify	Survey	2008/01/01-

	qualifications frameworks across APEC economies		formal and informal qualifications frameworks systems, associated descriptors and quality assurance frameworks, and recognition agencies across APEC economies.	Research	2008/09/30
Australia	Measures Affecting Cross Border Exchange and Investment in Higher Education in the APEC Region	Ongoing	This project will accord with the key objective of seeking to facilitate economic growth, cooperation, trade and investment in the region by identifying measures affecting cross border exchange and investment in higher education services across four modes of supply.	Research	2008/03/01-2008/10/31
China, Peru, USA	Education to Achieve 21st Century Skills for All	Completed on June 10th, 2008	EDNET project to organize a 3-day pre-Ministerial policy and research Symposium to prepare content and an agenda for the 4th APEC Education Ministerial Meeting (AEMM) to be held in Lima. The results of this symposium were distilled in a one-day seminar preceding the AEMM.	Conference Research	2007/06/01-2008/06/10
Malaysia	APEC Conference on Evaluation as a Tool in Educational Planning: Best Practices in Evaluation of Educational Programs	Completed	This conference is designed to promote evaluation as an indispensable tool in the planning and implementation of projects and programs.	Conference Research	2007/01/01-2007/12/30

			The conference would also disseminate key evaluation findings pertinent to educational planners and practitioners as valuable lessons learned and explore options relevant to their own economies.		
Australia	Share successful approaches to social inclusiveness in education: overcoming educational disadvantage, including through the use of early childhood education and ICT.	Proposed			
RESOURCES AND TOOLS					
Philippines	APEC Information and Communication Technology for Education Expo	Proposed	The expo aims to (1) widen dissemination and involvement in APEC ICT4E initiatives, (2) facilitate sharing of experiences and best practices, (3) gain support for upcoming ICT4E projects of developing economies and (4) provide a venue to reconvene the APEC Cyber Education Network.	Expo Research	2009/01/01- 2009/06/30
USA	Knowledge Bank of Education Policy and the APEC EDNET	Ongoing	The APEC Knowledge Bank is a web-based repository of education	Identification of promising practices and evidence based	

	forum website.		policy and practical resources from the Asia-Pacific Region, created to provide research-based information. The EDNET forum's business site with resources, project descriptions, and other EDNET information.	resources Dissemination of APEC resources	
Vietnam	APEC Symposium on Open Source and Open Course for E-Learning	Completed	This project proposes the planning and implementation of an international symposium on Open Source and Open Course for E-learning with the aim of giving an overview on the advantages and possibilities in that area and thus fostering the principles of good governance and the development of an Open Source and Open Course community.	Conference Research	2006/07/01-2007/07/01
TEACHER QUALITY AND INSTRUCTION					
Chinese Taipei	Encouraging the use of the lesson-study approach/method through on-line demonstrations and videos. Lessons should illustrate well-researched teacher practices and provide insight into how the	Proposed	Investigating the applications of the Lesson Study approach in the learning and teaching of languages. This project aims to: 1) Share the concept and examples of Lesson Study, through a DVD Workshop, as a realistic and effective	• Conference • Research	2009/01/01-2010/07/31

	lesson study process can further improve teacher practice.		approach for in-service teachers' professional development in the area of language teaching in and 2) Collaboratively apply and evaluate the Lesson Study approach for the pragmatic teaching of languages. Attention will be paid to how teachers change as a result and the corresponding effect on learning outcomes.		
STANDARDS AND ASSESSMENTS					
	Conducting a suitability study of how existing standards and assessments can best be used as an APEC language model, particularly expanding the lower levels to meet the needs of the learners in this region.	Recommended	(NOTE: To address the lack of relevant models for learning and using other languages in environments where they are not native (dominant) languages)	• Research	
Chile Chinese Taipei	APEC Learning Standards for English and Other Languages	Completed	This project aims at analyzing and comparing the language learning standards being used in APEC economies towards reaching an agreement of common standards and the best practices to promote them. This will facilitate increased mutual	• Conference • Research	2006/01/01- 2006/08/01

			support and sharing of resources. Avoiding duplication of efforts and expenses will be beneficial to all economies involved in wide-scale teaching of English and other languages as foreign languages.		
POLICIES AND RESEARCH					
	Conducting a survey of Member Economies' policies regarding multilingualism and multiculturalism.	Recommended	(NOTE: To address optimal stage for introducing L2 to avoid interference with L1 literacy formation and communication skills.)	• Research	
RESOURCES AND TOOLS					
	Contributing to and helping publicize a consumer checklist for APEC language learners to use to evaluate language learning programs				
	Contributing to and publicizing an inventory of existing teacher and student exchange programs by APEC members				
	Publicizing APEC e-learning programs including Chengo, OLLI, and the APEC				

	Business English program				
CROSS-CUTTING					
USA	Strategic Plan for English and Other Languages, which includes[9]: • Contributing to and helping publicize a consumer checklist for APEC language learners to use to evaluate language learning programs • Contributing to and publicizing an inventory of existing teacher and student exchange programs by APEC members • Publicizing APEC e-learning programs including Chengo, OLLI, and the APEC Business English program	Ongoing	This project responds to the 2004 Ministers directive to develop a Strategic Plan for English and Other Languages for the APEC region. Strengthening instruction in English and other languages through economy policies; synthesizing evidenced-based practices in the delivery of language instruction; identifying needed cooperative efforts to develop policy agreements, language research, and instruction and training packages; and emphasizing the integration of cultural studies into language instruction.	• Conference • Research • Outreach • Inventory of standards, assessments, programs, vocabulary lists, etc. • Material development • Creation of a consumer checklist for language teaching products	2007/12/01-2009/12/01

ECONOMY LEAD (Project Sponsor)	**NAME OF THE PROJECT**	**PROJECT STATUS[10]**	**DESCRIPTION OF THE PROJECT**	**PROJECT METHODOLOGY**	**PROJECT TIMELINE**
TEACHER QUALITY AND INSTRUCTION: Encourage teachers training and use of new teaching methodologies to help students achieve 21st Century Competencies and Skills.					

[9] For a complete list of activities under the Strategic Plan for English and Other Languages see Annex A.

	Evaluating different mathematics and science instructional approaches	Recommended			
	Launching multiyear collaborative online professional development	Recommended			
	Examining how to improve math-science connections	Recommended			
Thailand, Japan	Expanding and Generalizing Lesson Study for Improvement of the Quality of Teaching among APEC Members Economies: Collaborative Studies on Innovations for Teaching and Learning Mathematics in Different Cultures (IV)	Proposed	This project aims to encourage an expansion of lesson study workshops in various languages with live internet streaming video; share the editorial methods of good practices on Lesson Study with online lesson videos in description format; and develop good visible lessons among APEC member economies.	• Conference • Research • Video development for online dissemination	2009/01/01-2010/12/31
Philippines	Best Practices in Human Resource Capacity Building in Science and Mathematics	Proposed	This project has the objective of developing capacity for teacher education in science and mathematics through the sharing of best practices among APEC economies.	• Conference • Research	
Thailand, Japan	Collaborative Studies on Innovations for Teaching and Learning	Ongoing	This project builds on a previous project and shares the approaches of	• Conference • Research • Video development	2008/01/01-2008/12/31

[10] Projects marked as "Recommended" are recommendations resulting from discussions and/or presentations from the Xi'an pre-Ministerial Symposium held in January of 2008. Projects marked as "Proposed" were proposed during the 30th HRDWG Meeting in Bohol, Philippines for the 2009 APEC Funding Cycle

	Mathematics in Different Cultures (III)- Lesson Study focusing on Mathematical Communication		Lesson Study for the method of the improving quality of education in general. APEC HRDWG meeting in Vietnam accepted following plans: Mathematical Thinking (2007), Mathematical Communication (2008), Evaluation (2009), and Generalization (2010).		
Thailand, Japan	Collaborative Studies on Innovations for Teaching and Learning Mathematics in Different Cultures (II) - Lesson Study focusing on Mathematical Thinking -	Completed	Project aims to: 1) collaboratively develop innovations on teaching and learning maths in different cultures of the APEC member economies. 2) develop collaborative framework involving maths education among the APEC member economies.	• Conference • Research	2005/10/01-2006/10/01
Japan	International Seminar on Best Practices in Science and Mathematics Teaching	Completed	The seminar brought together key educators and teacher trainers of science and mathematics from selected APEC member countries to share/demonstrate their innovative practices in the training of science and mathematics teachers either at pre-service or in-service level, to formulate plans of action for the establishment of networks/ partnerships to exchange best practices,	• Conference • Research	Completed 2006

			and to propose recommendations for follow-up actions.		
STANDARDS AND ASSESSMENTS: (drafting our goal)					
	Continuing to translate and analyze mathematics and science standards	Recommended			
	Developing a bank of mathematics and science test items	Recommended			
USA	APEC 21st Century Mathematics and Science Standards and Assessments: A Focus on Middle and Secondary Schools	Proposed	This project to builds on the existing standards comparative analysis from the Xi'an Symposium. This project makes standards and assessments from APEC available in English and provides comparative analysis. Results will be shared in a 2010 Conference focusing on Secondary Schools.	• Conference • Research • Case Study	2009-2010
POLICIES AND RESEARCH: (drafting our goal)					
	Conducting case studies into lessons learned about how and why APEC economies change policy directions	Recommended			
	Evaluating course requirements and assessments required for upper secondary	Recommended			

	school graduation or college admissions				
USA	APEC Encouraging Girls in Mathematics and Science	Proposed	This project on encouraging girls in math has activities including soliciting case studies from researchers APEC Member Economies to share at a 2010 conference and developing of an APEC-wide Practice Guide summarizing the research.	• Conference • Research • Case Study	
Malaysia	Best Practices in Math and Science Seminars Elementary and Secondary School Levels	Completed	The broad aim of this seminar is to enable experts and specialists in science and mathematics education from APEC member economies to present their thoughts and ideas which have brought about an improvement in educational practices at the secondary school level. This responds to globalisation and challenges brought about by technological advancement in ICT, which necessitate change in the education paradigm.	• Conference • Research	2004/01/01-2004/12/01
RESOURCES AND TOOLS: (drafting our goal)					

	Using the HRDWG wiki as a tool for on-going APEC international collaboration	Ongoing	Translated math and science standards and comparative analysis are now available on the wiki as well as lesson study videos	APEC nominated experts contribute to the HRDWG wiki site.	2008/01/01-