
Purpose: Information
Submitted by: United States
# Factsheet

(Tick ✓ one)  
[ ] Project seeking APEC funding  
[✓] Progress Report  
[ ] Project for self-funding  
[ ] Evaluation Report  

(Tick ✓ one where applicable)  
[ ] Operational Account  
[ ] TILF Special Account  

<table>
<thead>
<tr>
<th>Project number:</th>
<th>Date received by Secretariat:</th>
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<thead>
<tr>
<th>Name of Committee/Working Group:</th>
<th>The Human Resources Development Working Group/Education Network</th>
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<table>
<thead>
<tr>
<th>Title of Project:</th>
<th>Identifying Unique and Promising Practices in Secondary Math and Science Teacher Education in APEC Economies</th>
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<tr>
<th>Proposing APEC Economy:</th>
<th>United States</th>
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<th>Co-sponsoring APEC Economy (ies):</th>
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<tr>
<th>Project Overseer:</th>
<th>Name, Title and Organization (M/F)</th>
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<tbody>
<tr>
<td>Andrew Porter,</td>
<td>Dean, University of Pennsylvania Graduate School of Education</td>
</tr>
<tr>
<td>Tel: 215-898-7014</td>
<td>Email: <a href="mailto:andyp@gse.upenn.edu">andyp@gse.upenn.edu</a></td>
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| Type of Project: | [ ] seminar/symposium  
[✓] short-term training course  
[ ] survey or analysis and research  
[ ] database/website  
[ ] others: |
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<th>Project start date:</th>
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Brief description of Project: its purpose and the principal activities (including when and where):

The four-year research project will analyze secondary school mathematics and science teacher preparation in each participating economy to generate informed and detailed hypotheses about how teacher preparation might be improved, drawing on promising practices from one or more other economies in the comparative study. The study will bring together experiences of the East and West and enable mutual learning from each other. The ultimate goal is to identify unique and promising teacher preparation practices, as well as approaches to meeting key challenges in each economy, using standardized research protocols that facilitate comparative analysis. The primary audiences for the work are policymakers and research institutions in each economy.

The work will proceed in three phases. The first phase, which is already underway, consists of designing the studies and the research protocols. The second phase consists of conducting the studies with common protocols that will facilitate comparisons across economies. Each economy will conduct its own research using its own resources following the international protocols. In the third phase, international comparisons will be made using the data collected by each economy. Based on the comparative findings, each economy can consider promising practices that may be adopted in its context. Phase Three will be conducted in a collaborative fashion in order to allow each participating economy to raise questions of interest during the analysis stage. This research will not establish causal connections between preparation practices and pre-service teacher outcomes, but can lay the groundwork for targeted research and experimentation within economies.
There are five areas of research:

1. A broad survey of approaches to secondary school mathematics and science teacher education in each economy to determine the degree of variance within economies

2. Structured case studies of mathematics and science secondary school teacher education systems to describe in detail and for comparative purposes the context of teacher education (e.g. the status of the teaching profession, work conditions) and the pre-service teacher education system (e.g. curriculum, accreditation, and certification requirements)

3. Case studies of unique and promising practices as well as challenges to secondary math and science teacher education in each economy

4. Competency assessment of teacher content knowledge, pedagogical knowledge, and pedagogical content knowledge as measures of teacher readiness (ideally assessed at the conclusion of education prior to becoming a teacher of record)

5. Generating and disseminating international comparative findings that illustrate correlations between various preparation strategies and the internationally-established measure of pre-service teacher readiness.

At the invitation of the University of Pennsylvania Graduate School of Education, representatives from governments and organizations in Australia, China, Japan, New Zealand, the Republic of Korea, Russia, Singapore, Thailand, and the United States met on June 16-17 and again on October 27-28, 2008 to plan the comparative research. The project will continue to follow the already established collaborative research strategy as it moves from Phase One to Phase Two and Three.

The first meeting of the study’s Working Group was held November 10-12 in Moscow, Russia to debate and finalize aspects of the study’s focus and design. The meeting was attended by representatives from the following economies: China, Japan, New Zealand, Russia, the Philippines, Singapore, Thailand, and the United States.

Each “data-contributing” economy will fund research of its secondary school mathematics and science teacher education system, as well as participation in the international meetings. In addition, each of them will pay a participation fee of $30,000 USD, a common practice of international comparative studies in Education. The International Programs at the University of Pennsylvania Graduate School of Education (GSE-International) will provide the central infrastructure for the international comparative analyses and dissemination.

There will also be a “non-data contributing” group of participating economies. These economies will not be required to submit the participation fee. They will not collect, analyze or interpret data, but will be given results of the study from the “data-collecting” economies, and will be invited to select study meetings. This “non-data contributing” group will be open only to developing economies.

Periodic reports useful to participating economies will be published. At the end of the study, the final outcomes and corresponding recommendations will be presented in the APEC economies at the ministerial level to promote effective policy and practice in secondary school math and science teacher education.

Signature of Project Overseer: Andrew Porter

(Separate written confirmation acceptable for email submission) Date:

Signature of Committee Chair/WG Lead Shepherd: (Not applicable to Progress Report and Evaluation Report)

(Separate written confirmation acceptable for email submission) Date:
## Status/Progress and Problems

<table>
<thead>
<tr>
<th>Current status of project:</th>
<th>On schedule (Yes)</th>
<th>Within budget (N/A)</th>
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### Objectives

**How do results of the project thus far (if any) compare with its expected results?**

The study is currently in its planning phase (Phase 1 as described above). At the meeting in Moscow (November 2009), a timeline and study design were established. Participating economies have been involved in the development of a common data collection protocol. That protocol is being finalized with the goal of putting it into use from April through June, 2010. This instrument and information will allow us to proceed with activities one through three identified above. We are currently planning a meeting of participating economies to be held in Shanghai in April, 2010. This meeting will allow us to identify those cases that will be studied more in depth and will begin development of the common metric of teacher readiness to be administered to pre-service teachers.

### Linkages, Methodology, Budget

**Describe any problems which have arisen and how they were resolved, including changes in schedule or revised dates, budget changes, changes in participation, or additions or deletions of activities.**

No significant challenges have arisen to the implementation of this project. Our timeline has been modified somewhat due to requests from various participating economies. Below, we provide a timeline reflecting current plans for the study.

- **Phase 1**
  - December 2009 - Contextual Data Framework submitted to the Working Group for comment (**Completed**)
  - January 2010 - Contextual Data Definitions submitted to the Working Group for comment (**Completed**)
  - End of February 2010 – Each economy must make final decision regarding participation in study
  - March 2010 - Contextual Data Definitions piloted by each participating economy
  - April 2010 – Working Group meeting to finalize Contextual Data Definitions, National Sampling decisions
  - April-June 2010 – Contextual Data collection
- **Phase 2**
  - April 2010- April 2011 – Instrument Development
    - Math and Science specific content knowledge (CK) and pedagogical content knowledge (PCK) testing instruments
  - May 2011-2013 – CK and PCK Data Collection
- **Phase Three**
  - 2014-2015 – CK and PCK Data Analysis
  - 2015 – Presentation of Findings at APEC Education Minister’s Conference

The economies that have expressed interest in participating in this study currently include: China, Japan, New Zealand, Russia, the Philippines, Singapore, Thailand, and the United States. Other economies that supported the project during the Chicago APEC EDNET Board meeting but have not made a final determination about their participation include: Australia, Chile, Korea, Peru, Chinese Taipei and Viet Nam. Due to a variety of factors specific to individual economies, the list of participants has changed, and is subject to further change. We expect the final list of participating countries to be determined by the end of February 2010.
Progress since last report

The working group for the “Identifying Unique and Promising Practices in Secondary Math and Science Teacher Preparation in APEC Economies” study met in Moscow, Russia from November 10-12, 2009. The goals of the meeting were three-fold: first, to update partner economies on the development of the study; second, to debate and finalize aspects of the study focus and design (including the contextual data that would be collected in Phase 1); and lastly, to set a timeline in which to move the project forward.

The meeting was attended by: Binyan Xu, Ding Gang, and Qiping Kong of East China Normal University; Masami Isoda of the University of Tsukuba, Japan; Alister Jones, Dean of the School of Education, University of Waikato, New Zealand; Leticia Catris and Ruby Lana of the Science Education Institute of the Philippines; Ivan Yaschenko and Ivan Vysotsky from the Moscow Center for Continuous Mathematical Education in Russia; Khoon Yoong Wong from the Singapore National Institute of Education; Maitree Inprasitha from Khon Kaen University in Thailand; and Elliot Weinbaum and J. Peter Letteney from the University of Pennsylvania in the United States.

Below, we provide a brief summary of the conclusions reached during the course of the meeting.

Scope of the Study

The working group made final decisions about the study’s scope. Though some of the variables had been discussed by a larger group in previous meetings held at the University of Pennsylvania, decisions at this meeting were finalized in order to allow the project to move forward with clear definitions and design. The working group decided:

- This study will measure effectiveness of teacher preparation programs. Effectiveness is defined here as how well pre-service teachers perform on an assessment designed to measure readiness to teach. This includes both content area expertise as well as teacher “knowledges” in several domains that contribute to pedagogical content knowledge. It does not refer to the subsequent impact that teachers may have on their students once they begin their teaching career.
- In order to measure program effectiveness within the timeframe for this study, we have tentatively decided to utilize a cross-sectional design assessing a cohort of students at entry and a cohort of students at the time of graduation. This will allow us to ascertain a measure of the gains that students experience as a result of their participation in the teacher preparation programs. This may be expanded depending on continued support for this study.
- This study focuses on pre-service teacher preparation programs and does not include ‘in-service’ teacher preparation. Pre-service teacher preparation is defined as being exclusive to the time during which an individual is a student at an established training institution and is the time prior to receiving certification to be the sole teacher for a class of students.
- While earlier meetings discussed the possibility of testing practicing teachers, this study will look at pre-service teachers only while they are at the teacher preparation institution.
- The study will focus exclusively on pre-service teachers preparing to teach ‘senior secondary’ school, which, for the purpose of this study, will be defined as the final two years of schooling prior to graduation.
- Teacher readiness will be measured in two content areas, maths and physical science.
  - Maths will include number sense, geometry, algebra, data.
  - The science component of the study will be limited to physics and chemistry. In order to assess readiness in science, the assessment will include two parts. All pre-service science physical science teachers will be expected to take an
assessment that will cover general physical science concepts as well as some broader concepts related to their understanding of science and practical instructional strategies. Pre-service teachers who are specializing in either physics or chemistry will then be expected to also take an assessment in their area of specialization. This assessment will be more heavily focused on content area expertise.

- In addition to the assessment of teacher readiness, pre-service teachers will be surveyed about both their experiences in the teacher preparation programs (as a sort of implementation measure) as well as their beliefs about teaching. Items for which there are no "right" or "wrong" answers but which may help to contextualize outcome data will be included in this "survey" section which will accompany the assessments given to all participants.

- Sampling for this study will be determined at the economy level based on the environmental scan or contextual context that each economy will prepare using a common framework (this framework is described in general terms below). Each economy will develop a "representative" sample. The definition of "representative" will be further defined based on both the contextual scan and further review of sampling done in other international studies.

**Contextual Framework**

During Phase 1 of the study each economy will describe the context in which teacher preparation occurs. Data collected will include information on each economy’s education system, the entry and selection into teacher training, and the ‘typical’ teacher education program. All of the data listed below will be focused on teacher preparation for the high school level. Each of the terms below will be further defined prior to the start of data collection. Some of the data to be collected include:

**Economy Context**
- Finance of Teacher Education
- Access to University
- University Level Program Approval Process
- Teacher Standards (e.g. licenses)
- Size and Type of Teacher Preparation Programs
- Number of Teacher Education Graduates
- Process for Becoming a Fully-licensed Teacher
- Structure of Schooling
- National Education Attainment Level (e.g. TIMMS/PISA scores, school completion rates)

**Selection and Entry into Teacher Education**
- Previous Education Requirements
- Entrance Exam or Evaluation
- Language, Literacy, Numeracy (LLN) Requirements
- Self-Selection

**Teacher Education Programs**
- Duration of Programs
- Concurrent or Consecutive Programs
- Required Curriculum
- Practicum/Field Experience
- Characteristics of Instructors
- Course Specific Resources

Each of these categories will be further detailed and defined through a collaborative process according to the study’s timeline. The combination of this data from all participating countries will provide a descriptive document allowing for comparisons among teacher preparation programs. This document will be an early ‘deliverable’ from the project of use both to subsequent phases of this project and potentially to other international studies.

**Notes:**
- All Committee and Working Group projects, irrespective of their source of funding, should be reported to BMC.
- Please mark “N.A.” if any item is not applicable.
Progress Report:
Identifying Unique and Promising Practices in Secondary Math and Science Teacher Education in APEC Economies
Submitted by the USA

Project Overview
This research project will analyze secondary school mathematics and science teacher preparation. There are five areas of research:
• A broad survey of approaches to teacher education
• Structured case studies of teacher education systems
• Case studies of unique and promising
• Competency assessment of teacher content knowledge, pedagogical knowledge, and pedagogical content knowledge as measures of teacher readiness
• Generating and disseminating international comparative findings.
Project Progress: Phase 1

– December 2009 - Contextual Data Framework submitted to the Working Group for comment (Completed)
– January 2010 - Contextual Data Definitions submitted to the Working Group for comment (Completed)
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– April-June 2010 – Contextual Data collection

Project Progress: Phase 2 & 3

• Phase 2
  – April 2010- April 2011 – Instrument Development
    • Math and Science specific content knowledge (CK) and pedagogical content knowledge (PCK) testing instruments
  – May 2011-2013 – CK and PCK Data Collection

• Phase Three
  – 2014-2015 – CK and PCK Data Analysis
  – 2015 – Presentation of Findings at APEC Education Minister’s Conference