Peer evaluation of teaching as collaborative inquiry:

JUGYOKENKYUU (LESSON STUDY)

Steven Rogg, Ph.D.
March 26, 2010

Abstract

The Japanese practice "*jugyokenkyuu,"* commonly translated as "Lesson Study" or "Lesson Research", is a form of teacher-led and student-focused professional development. This practice, common in schools in Japan, establishes a direct link between specific educational goals, teacher professional education, and student learning. Experiences of the *Chicago Lesson Study Group* suggest that this may also serve as a promising alternative to traditional peer evaluation of teaching. In this session, we will: (1) introduce key characteristics of *jugyokenkyuu*; (2) illustrate the alignment of *jugyokenkyuu* with core features of exemplary professional development; (3) report examples of *jugyokenkyuu* in professional education and peer evaluation; and (4) propose ideas for strengthening professional education and peer evaluation through collaborative inquiry in the practice of *jugyokenkyuu*.

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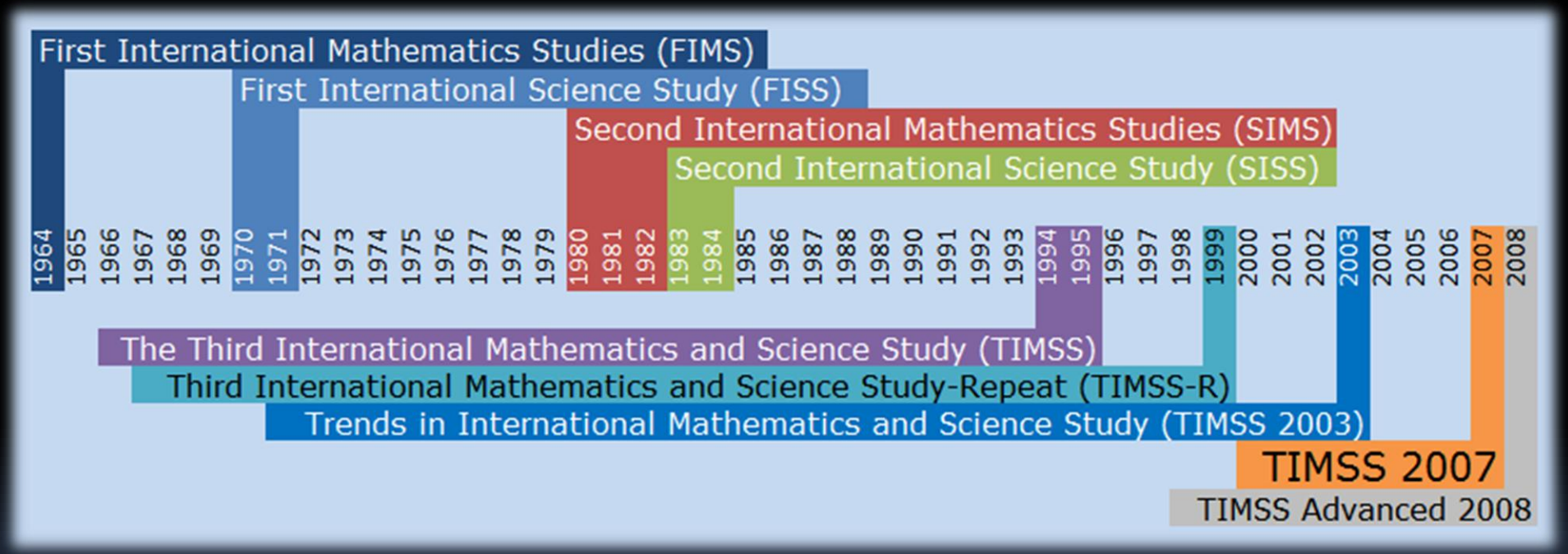
TIMSS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Third International Mathematics and Science Study-Repeat (TIMSS-R)
Trends in International Mathematics and Science Study (TIMSS 2003)
TIMSS 2007
TIMSS Advanced 2008

The Press Perspective…

U.S. students' math, science scores deliver mixed results

By Greg Toppo, USA TODAY

If there were a math-and-science Olympics for elementary and middle schoolers, USA students could hold their heads high — they're consistently better than average. In math, it turns out, they're improving substantially, even as a few powerhouse nations see their scores drop.

But at the end of the day, the USA never quite makes it to the medal podium, a dilemma that has educators and policymakers divided, with some saying factors outside school play a key role in both achievement and productivity in general.

For the first time since 2003, the results of the Trends in International Mathematics and Science Study, or TIMSS, a battery of international math and science tests among dozens of nations, are out — and they paint a somewhat mixed picture of achievement: On the one hand, the USA ranks consistently above international averages in both subjects.

On the other hand, several nations consistently outscore our fourth- and eighth-graders, with a few countries turning in eye-popping performances.

The Press Perspective…

EDUCATION WEEK

Published Online: December 9, 2008

Updated: December 10, 2008

Asians Best U.S. Students in Math and Science

By Kathleen Kennedy Manzo

Back to Story

American 4th and 8th graders continue to exceed the international average on math and science tests, but are still well behind their counterparts in several Asian nations and trail a few European countries, results released today show.

Students in Massachusetts and Minnesota who took part in the testing program, however, excelled ahead of their peers across the United States. Massachusetts in particular did as well as some of the leading Asian nations in some areas.

The Trends in International Mathematics and Science Study, or **TIMSS**, an ongoing assessment program sponsored by the International Association for the Evaluation of Educational Achievement, is sure to fuel the discussion about the adequacy of the effort in U.S. schools to improve instruction and curricula in the subjects.

"It's a good-news, bad-news kind of story. In mathematics, the U.S. is making steady progress, and since 1999, has significantly improved," said Ina V.S. Mullis, an executive director of the TIMSS & PIRLS International Study Center at Boston College, part of the international association. "However,

The Press Perspective…

The New York Times
nytimes.com

December 10, 2008

Math Gains Reported for U.S. Students

By SAM DILLON

American fourth- and eighth-grade students made solid achievement gains in math in recent years and in two states showed spectacular progress, an international survey of student achievement released on Tuesday found. Science performance was flat.

The results showed that several Asian countries continued to outperform the United States greatly in science and math, subjects that are crucial to economic competitiveness and research.

The survey, the Trends in International Mathematics and Science Study, or Timss, found that fourth-grade students in Hong Kong and eighth-grade students in Taiwan were the world's top scorers in math, while Singapore dominated in science at both grade levels.

"We were pleased to see improvements in math, and wished we'd seen more in science," said Stuart Kerachsky, acting commissioner of the National Center for Education Statistics at the Education

The Press Perspective…

washingtonpost.com

Scores on Science Test Causing Concern in U.S.

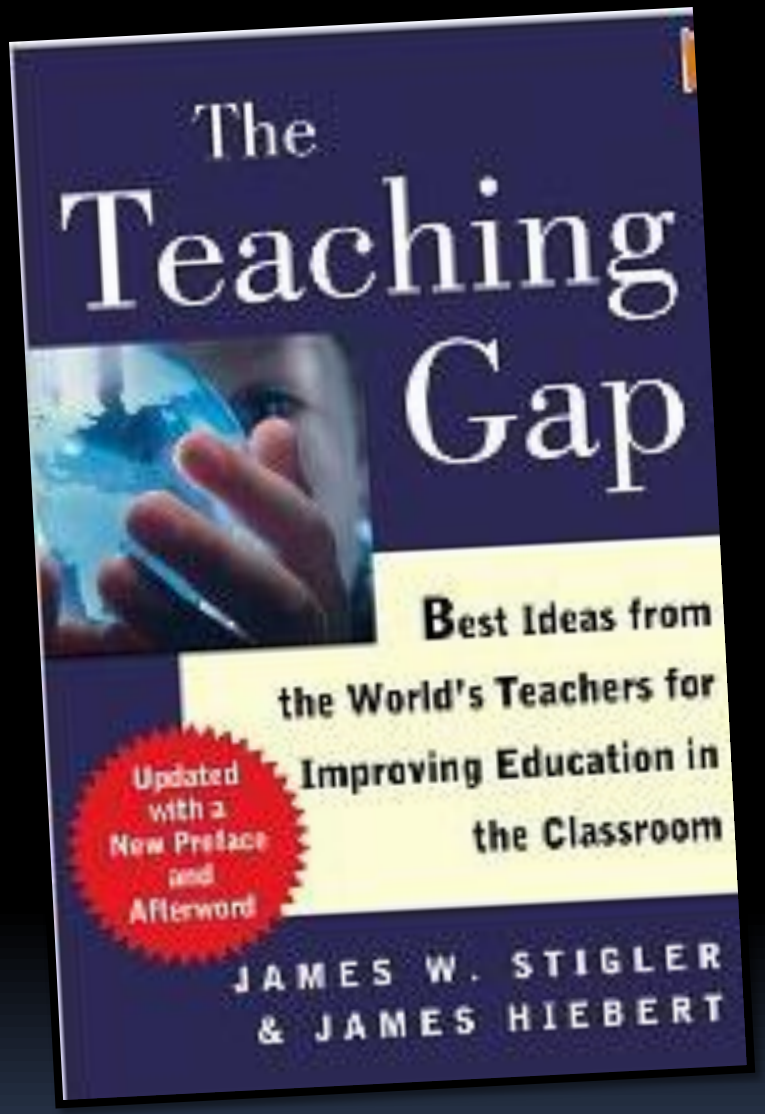
By Maria Glod
Washington Post Staff Writer
Wednesday, December 10, 2008; A10

U.S. students are doing no better on an international science exam than they were in the mid-1990s, a performance plateau that leaves educators and policymakers worried about how schools are preparing students to compete in an increasingly global economy.

Results of the Trends in International Mathematics and Science Study (TIMSS), released yesterday, show how fourth- and eighth-graders in the United States measure up to peers around the world. U.S. students showed gains in math in both grades. But average science performance, although still stronger than in many countries, has stagnated since 1995.

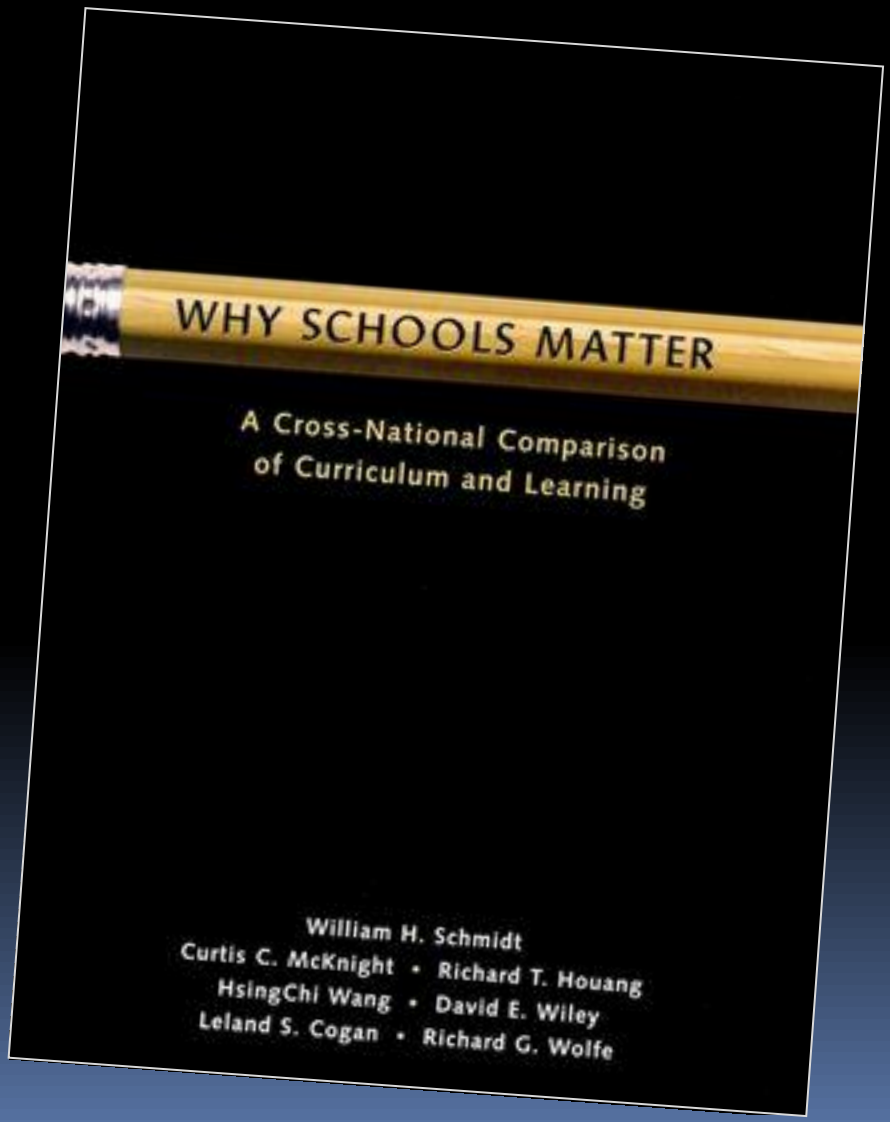
Students in Singapore, Taiwan, Japan and Hong Kong outperformed U.S. fourth-graders in science. The U.S. students had an average score of 539 on a 1,000-point scale, higher than their peers in 25 countries.

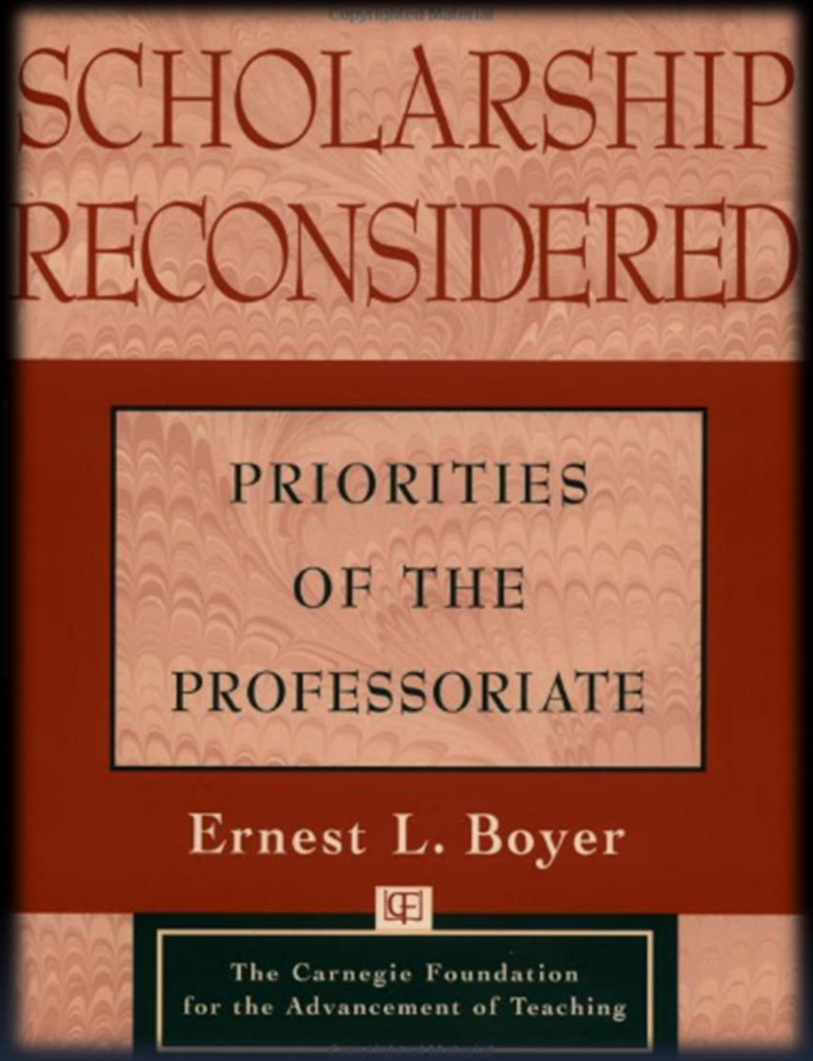
In eighth grade, Singapore topped the list, with an average score of 567. Students in Taiwan, Japan, South Korea, England, Hungary and Russia were among those earning higher marks than their U.S. counterparts. The average score in the United States was 520.

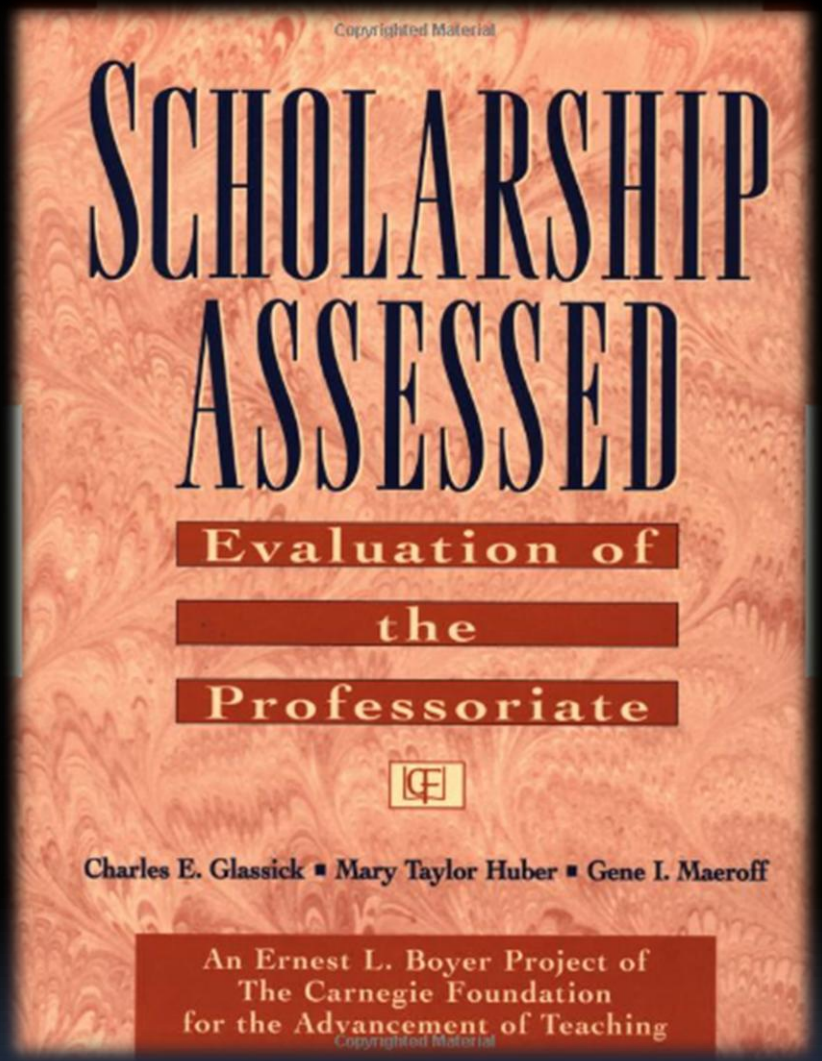


Stigler, J. W., & Hiebert, J. (1999). *The teaching gap: Best ideas from the world's teachers for improving education in the classroom. New York: Free Press.*

Schmidt, W. H. (2001). *Why schools matter: A cross-national comparison of curriculum and learning. San Francisco, Calif.: Jossey-Bass, A Wiley.*







Boyer, E. L. (1990). *Scholarship reconsidered: priorities of the professoriate. Princeton, N.J.: Carnegie Foundation for the Advancement of Teaching.*

Glassick, C. E., Huber, M. T., Maeroff, G. I., Boyer, E. L., & Carnegie Foundation for the Advancement of Teaching. (1997). *Scholarship assessed : evaluation of the professoriate (1st ed.). San Francisco: Jossey-Bass.*

edweek.org

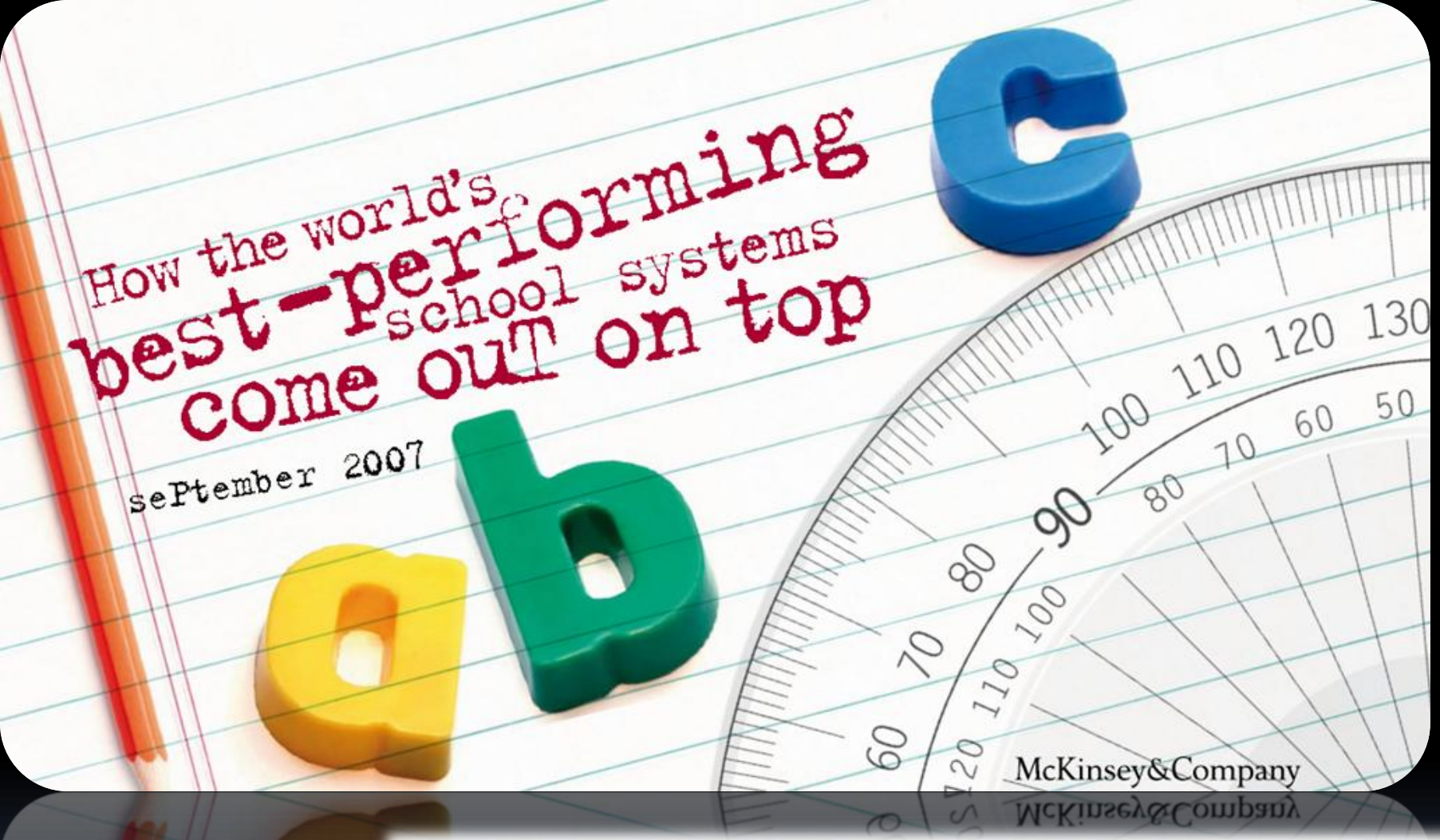
Published Online: February 17, 2010

COMMENTARY

Teacher Learning: Sine Qua Non of School Innovation

By Stephanie Hirsh

You wouldn't know it from current discussions about teacher effectiveness, but the talent and expertise needed to raise student achievement already exist in many, if not most, schools. Unfortunately, too few of them have a culture that encourages teachers and administrators to work together on a regular basis, to consult each other more often on matters of teaching and learning, to share responsibilities for instructional improvement, and to implement professional-learning opportunities that address both their needs and their students'.



1. "The quality of an education system cannot exceed the quality of its teachers"
2. "The only way to improve outcomes is to improve instruction"
3. "High performance requires every child to succeed"

Exhibit 21: Japan: Learning communities

Enabling teachers to share best practice, learn from each others strengths and weaknesses, and jointly develop and disseminate excellent practice

Lesson study

Teachers work in teams to analyse and develop model lessons. The study requires each teacher to reflect in depth on their own practice, with the assistance of their peers. The final sample lessons are recorded and distributed.

Demonstration lessons

Teachers demonstrate excellent practice to a wider group of instructors, followed by discussion and feedback sessions. The lessons are used to give each teacher access to examples of excellent practice, to recognise development, and to hold teachers accountable for the quality of their instruction

- **Japan:** The learning culture in its schools is centred on 'lesson study' (kenkyuu jugyou). Groups of teachers work together to refine individual lessons, jointly planning, executing and then evaluating different instructional strategies for achieving a specific learning objective. Groups of teachers visit each others classrooms to observe and understand the practice of other teachers (Exhibit 21). There is a strong emphasis on making sure that best practices are shared throughout the school: "When a brilliant American teacher retires, almost all of the lesson plans and practices that she has developed also retire. When a Japanese teacher retires, she leaves a legacy."[55]

Lesson Study Overview

- Set Team Learning Goals
  - School Improvement, Teacher Learning & Student Learning
- Lesson Design (~5-weeks)
- Research Lesson (Internal or Public)
  - Briefing→ Teaching→ Observing→ Debriefing
- Revising and Re-teaching (optional)
- Reflecting, Sharing Insights, Documenting

Three Major Forms of Lesson Study

Example of Lesson Study Groups	Description	Main Purpose
School-Based	•Usually all teachers from a school participate •Establish a school Lesson •Form several subgroups that engage in a lesson study cycle	•Achieving systematic and consistent instructional and learning improvement in the school as a whole •Developing a common vision of education at the school through teacher collaboration
Cross-School (District-wide)	•Organized as an intra-school Lesson Study group •Usually subject-oriented groups (e.g., math teachers from each school in the district gather to conduct lesson study) •Meet once or twice a month	•Developing communication among the schools in the district •Exchanging ideas between the schools •Improving instruction and learning in the district as a whole
Cross-District (Regional or Nation-wide)	•Usually a voluntarily organized group •Group of enthusiastic practitioners with purpose of improving teaching and learning or curriculum in a certain subject •Meet once or twice after school on off-school days	•Developing new ideas for teaching topics •Investigating curriculum sequences and contents •Developing curriculum

http://hrd.apecwiki.org/index.php/Lesson_Study_Overview

Some Key Processes *Jugyokenkyuu*

Term	Meaning
kyozaikenkyu	instructional material research
kenkyu jugyo	research lesson
hatsumon	posing key questions
bansho	blackboard writing
kikanshidoi	in-between desk instruction
neriage	extensive whole-class discussion

http://hrd.apecwiki.org/index.php/Glossary_of_Lesson_Study_Terms

Teaching → Learning

How do we anticipate student understandings and responses?

- Familiarity/Empathy
  - with your prior cohorts of students
  - with your current cohort of students
- Extrapolation
  - from your own experiences/ideas of schooling
- Grounding
  - base in generalized systematic research
- Others?

APEC Human Resources Development Working Group

http://hrd.apecwiki.org/index.php/Lesson_Study

HUMAN RESOURCES DEVELOPMENT WORKING GROUP

PAGE | DISCUSSION | VIEW SOURCE | HISTORY

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Lesson Study

The APEC Education Network (EDNET) is sponsoring projects which are using Lesson Study as a way to improve the quality of education in both Mathematics and Language Learning. Classroom Innovations Through Lesson Study aims to improve the quality of Mathematics education in APEC economies through the use of Lesson Study techniques. Additionally, In 2009, EDNET launched a similar project in Language Learning titled Study of Best Practices in Teaching and Learning Languages in APEC Economies: Lesson Study Applications.

Contents

- **Lesson Study Main Page**
- Lesson Study Overview
  - Video Introduction of Lesson Study
- Classroom Innovations Through Lesson Study
  - APEC - TSUKUBA International Conference (2006)
  - Innovations for Teaching and Learning Mathematics in Different Cultures II (2007 Conference)
  - Innovation of Classroom Teaching and Learning through Lesson Study (2008 Conference)
  - Lesson Study Videos
    - Multiplication Algorithm
    - Thinking Systematically
    - Area of the Circle
    - Do I Have a Window Seat or an Aisle Seat?
    - Multiply and divide fractions

Key Topics

- Lesson Study Overview Provides Overview of Lesson Study including history and explanation
- Lesson Study Videos: An index of the videos of research lessons contained on the HRDWG Wiki
- Lesson Study Papers: An index of the papers presented at conferences related to the APEC project. The papers contain analysis of Lesson Study developments
- Guide for Planning and Analyzing Mathematics Lessons in Lesson Study
- Glossary of Lesson Study Terms

Lesson Study demonstration: 5th graders solving an equation in front of the class

Resources

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(4) propose ideas for strengthening professional education and peer evaluation through collaborative inquiry in the practice of *jugyokenkyuu*.

Three characteristics set Lesson Study apart from typical professional development programs:

- Lesson Study is teacher-led.

  Through it teachers can be actively involved in the process of instructional change and curriculum development.

http://hrd.apecwiki.org/index.php/Lesson_Study_Overview#Lesson_Study_in_Japan

Three characteristics set Lesson Study apart from typical professional development programs:

- Lesson Study provides opportunity to directly study teaching and learning in the classroom.

  Teachers focus their discussions on planning, implementation, observation, and reflection on classroom practice. By looking at actual practice in the classroom, teachers are able to develop a common understanding or image of what good teaching practice entails. This in turn helps students understand what they are learning.

http://hrd.apecwiki.org/index.php/Lesson_Study_Overview#Lesson_Study_in_Japan

Three characteristics set Lesson Study apart from typical professional development programs:

- Lesson Study keeps students at the heart of the professional development activity.

  It provides an opportunity for teachers to carefully examine the student learning and understanding processes by observing and interpreting actual classroom practice.

http://hrd.apecwiki.org/index.php/Lesson_Study_Overview#Lesson_Study_in_Japan

…which looks like "How Students Learn…"

A community-centered classroom that relies extensively on classroom discussion, for example, can facilitate learning for several reasons…

- It allows students' thinking to be made transparent—an outcome that is critical to a learner-centered classroom. Teachers can become familiar with student ideas... Teachers can also monitor the change in those ideas with learning opportunities, the pace at which students are prepared to move, and the ideas that require further work—key features of an assessment-centered classroom.
- It requires that students explain their thinking to others. In the course of explanation, students develop a disposition toward productive interchange with others (community-centered) and develop their thinking more fully (learner-centered)...
- Conceptual change can be supported when students' thinking is challenged, as when one group points out a phenomenon that another group's model cannot explain (knowledge-centered).

National Research Council. (2005). *How students learn: science in the classroom. Washington, D.C.: National Academies Press.*

High-Quality PD

"Research on teacher learning shows that fruitful opportunities to learn new teaching methods share several core features:

- ongoing (measured in years) collaboration of teachers for purposes of planning with
- the explicit goal of improving students' achievement of clear learning goals,
- anchored by attention to students' thinking, the curriculum, and pedagogy, with
- access to alternative ideas and methods and opportunities to observe these in action and to reflect on the reasons for their effectiveness . . ."

Hiebert, J. (1999). Relationships between Research and the NCTM Standards. *Journal for Research in Mathematics Education, 30*(1), 3-19.

NRC. (1996). *National Science Education Standards : observe, interact, change, learn*. Washington, DC: National Academy Press.

CHANGING EMPHASES

The *National Science Education Standards* envision change throughout the system. The professional development standards encompass the following changes in emphases:

LESS EMPHASIS ON	MORE EMPHASIS ON
Transmission of teaching knowledge and skills by lectures	Inquiry into teaching and learning
Learning science by lecture and reading	Learning science through investigation and inquiry
Separation of science and teaching knowledge	Integration of science and teaching knowledge
Separation of theory and practice	Integration of theory and practice in school settings
Individual learning	Collegial and collaborative learning
Fragmented, one-shot sessions	Long-term coherent plans
Courses and workshops	A variety of professional development activities
Reliance on external expertise	Mix of internal and external expertise
Staff developers as educators	Staff developers as facilitators, consultants, and planners
Teacher as technician	Teacher as intellectual, reflective practitioner
Teacher as consumer of knowledge about teaching	Teacher as producer of knowledge about teaching
Teacher as follower	Teacher as leader
Teacher as an individual based in a classroom	Teacher as a member of a collegial professional community
Teacher as target of change	Teacher as source and facilitator of change

"The frame and the tapestry"…

"WHY NEW FORMS AND FORMATS FOR PROFESSIONAL DEVELOPMENT ARE NOT NECESSARILY THE ANSWER, AND WHAT MIGHT BE"

Thompson, C. L., & Zeuli, J. S. (1999). The frame and the tapestry: Standards-based reform and professional development. In L. Darling-Hammond & G. Sykes (Eds.), *Teaching as the learning profession: Handbook of policy and practice (pp. 341-375). San Francisco: Jossey-Bass.*

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Example 2: Electrical Circuits

Teacher Candidates and Faculty Peer Review

Experience the 5-E Instructional Model with Electrical Circuits

- Engage: Set up the challenge "Make Light"
- Explore: Alternative ways to "Make Light"
  - or ~~*not*~~
  - or *heat*
- Explain: Construct Meaning from Solutions
  - seeing the "circuit" as *path*
- Elaborate: The Circuit Inside
- Evaluate: The "Post Lesson Discussion"

Understanding electrical circuits…

1. Search for the term "electric" in Chapter 7 of Designs for Science Literacy at: http://www.project2061.org/publications/designs/ch7.pdf
2. Check the research base (albeit not up-to-date) in Resources for Science Literacy. Simply search for "electric" (or "electric circuit") in the search field on this page: http://www.project2061.org/publications/rsl/online/RESEARCH/COG_TOC.HTM
3. The Illinois Learning Standards for Science do not speak to electric circuits explicitly. The only goal found for electricity at the elementary level was: "12.C.2a Describe and compare types of energy including light, heat, sound, electrical and mechanical." Of course, we can look to *Benchmarks for Science Literacy* and the *National Science Education Standards*, too. http://www.isbe.net/ils/science/pdf/goal12.pdf
4. The new *Handbook of Research on Science Education* has a relevant chapter. It turns out that there are at least **444 published studies about electric circuits** (Duit, Neidderer, & Schecker, 2007, p606). Reference: Duit, R., Neidderer, H., & Schecker, H. (2007). Teaching Physics. In S. K. Abell & N. G. Lederman (Eds.), Handbook of research on science education (pp. 599-629). Mahwah, N.J.: Lawrence Erlbaum Associates.

Akihiko Takahashi

Regarding the Research Lesson

"When I heard about your idea of using lesson study…, I was fascinated because it could be a great opportunity for not only us to see prospective students' learning to discuss **ways to improve our teaching approaches** but also the prospective teachers to know a new way of professional development in action."

Akihiko Takahashi

Regarding the Briefing

- The class was schedule to begin at 5:30pm …. There [were] two members from Chicago Lesson Study Group Science Team [that joined us]. Before the prospective teachers arrived, we had a pre-observation conference at the room by looking at all the materials that you prepared. You provide us a detailed lesson plan, which include the goals of the lesson, the rational of the lesson, and anticipated prospective teachers' responses. By looking at the lesson you explained to us why the topic "electric circuit" is challenging for prospective students and how you plan to help them overcome the difficulties.

Akihiko Takahashi

Regarding the Lesson Proper

"In order for prospective teachers to discover rules in an electric circuit, you opened the class by posing the challenging task "make light". {…} The prospective teachers are expected to tackle independently first, then share their trials to others to find ideas for making light. Through this hands-on inquiry-based learning, each prospective teacher was going to experience this instructional approach as a student."

Akihiko Takahashi

Regarding the Post Lesson Discussion

"After the break, you ask three of us to join the panel to discuss what we observe during the lesson. This is called post-lesson discussion in lesson study. The panel is expected to use the data from the observation to address issues to improve the lesson. Prospective teachers [were] also invited to share how they received from the class. Although I have been doing lesson study nearly 30 years, this is the first time to do a post-lesson discussion with "students" who were in the classroom. I find it very powerful because the "students" were prospective teachers who were very keen to learn innovative approach to become good science teachers."

7E Conclusions

- Did the teacher candidates learn something about electricity?
  - Yes, and this was very limited.
  - This is forgivable since this is decisively ***not*** a physics or physical science class.
  - Mostly the teacher candidates were confronted with how terribly little they had learned in elementary school, high school, and college! (Which is, of course, disturbing enough.)
- Did the teacher candidates experience a reasonable representation of a 5-E learning cycle model?
  - We are confident that they did.
  - It was striking how naturally the 5-E model mapped into the lesson study template.
- Did the teacher candidates consider the utility of the 5-E instructional model?
  - Feedback from students at the subsequent meeting was very positive.
  - Consensus was that the experience was far more effective that simply reading and discussing.

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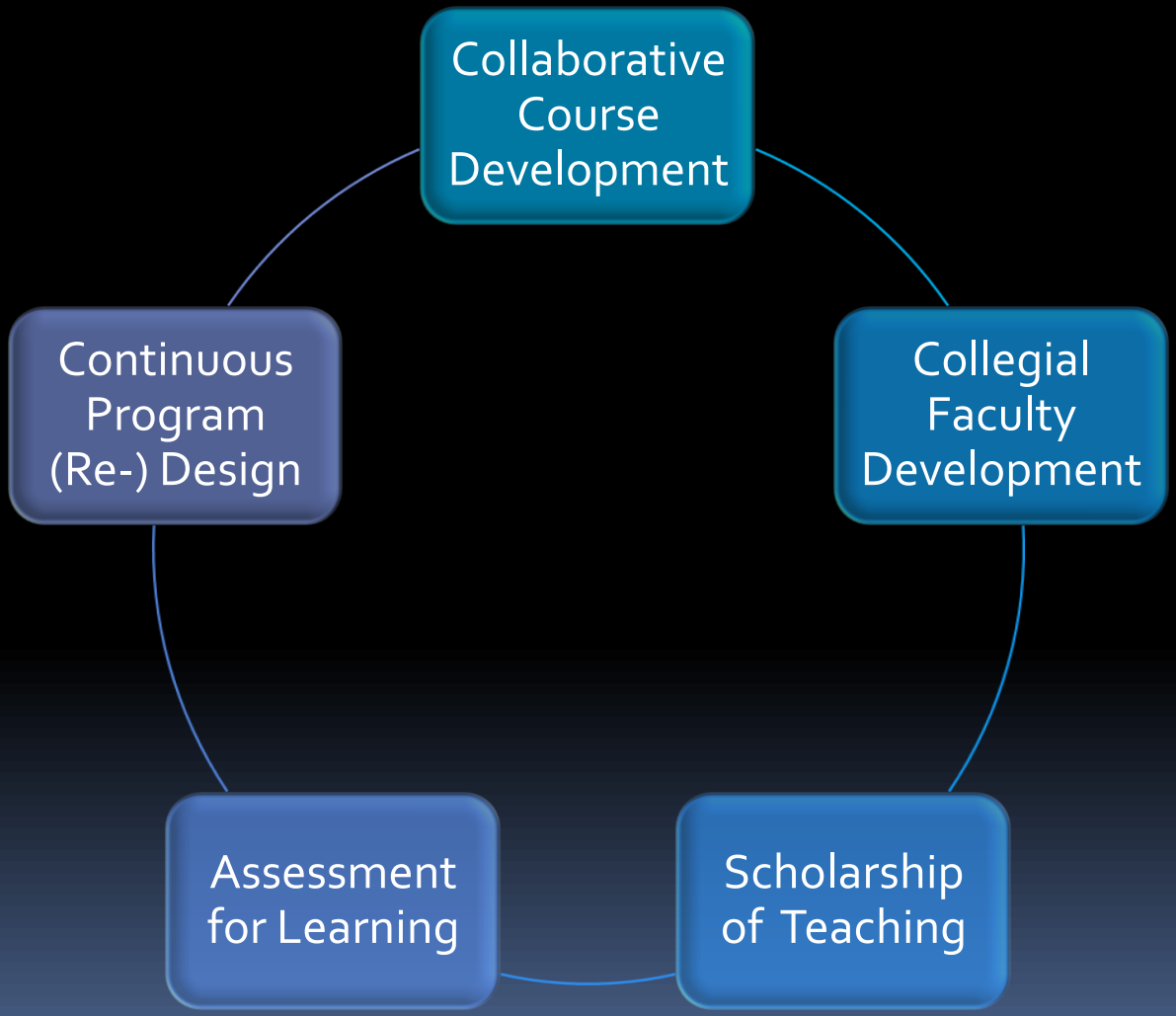
Lee Shulman (2005) on "Signature Pedagogies" in Law, Medicine, the Clergy and Education

"What I am imagining now is a signature pedagogy for teacher [education] that combines the best features, on one end, of *case method—where you're dealing with the rich, growing archive of existing* cases—*a*nd on the other end, our best ideas from *lesson study, where you're now taking what you want to do*, jointly designing it, trying it out, seeing how it works, and bringing that back to the seminar or workshop in which you're working on learning to teach."

Alone or *Jugyokenkyuu*

Connecting the Elements



"7E" Lesson References

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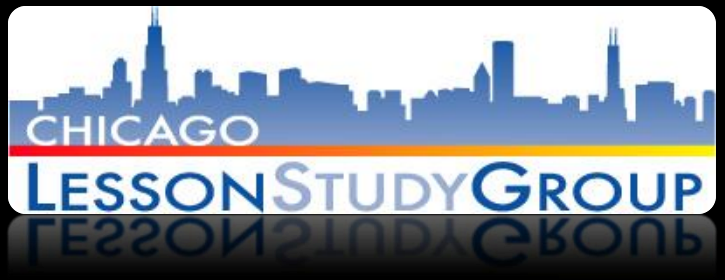
Resources



http://lessonstudygroup.net/

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