

**International Trends in Mathematics Teaching and Learning: A Look
at the TIMSS Video Study
C&I 530, Sec. A
CRN: 31998**

Spring 2005
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Mondays, 4-7
Room 166

This seminar will examine the findings of the *Third International Mathematics and Science Study (TIMSS) 1999 Video Study*, also known as *TIMSS-R*. *TIMSS* is currently known as *Trends in International Mathematics and Science Study*. The findings from the *Video Study* will serve as a starting point for discussions about mathematics teaching and learning. Because the findings report on mathematics teaching in seven countries, the differences in teaching approaches between countries afford alternative ways of thinking about mathematics teaching and considering the implications for school mathematics in the U.S.

The seminar is designed to facilitate your thinking about a school mathematics problem that arises from readings and discussions about the *TIMSS Video Study*. Accordingly, structured reading assignments and one-page summaries provide the background for engaging important mathematics education questions and making sense of the *Video Study*. Examination of the video clips that accompany the report, readings, class discussions, an annotated bibliography and informal presentations serve to identify and refine questions for which you will pursue answers. Through examination of the research, a core expectation is that you develop an informed and reasoned position about a school mathematics issue important to you. Your intellectual engagement will culminate in a scholarly product, a journal article length paper.

Required Texts: (Can be purchased at the book store)

American Psychological Association. (2001). *Publication manual of the American Psychological Association* (5th ed.). Washington, D. C.: Author.

Course Reader PLU 12726

Fennema, E. & Romberg, T. (Eds.). (1999). *Mathematics classrooms that promote understanding*. New Jersey: Lawrence Erlbaum Associates.

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.

(Will be given to you on the first day of class)

U.S. Department of Education, National Center for Education Statistics. *Teaching mathematics in seven countries: Results from the TIMSS 1999 Video Study, NCES (2003-013)*, by James Hiebert, Ronald Gallimore, Helen Garnier, Karen Bogard

Givvin, Hilary Hollingsworth, Jennifer Jacobs, Angel Miu-Ying Chui, Diana Wearne, Margaret Smith, Nicole Kersting, Alfred Manaster, Ellen Tseng, Wallace Etterbeek, Carl Manaster, Patrick Gonzales, and James Stigler. Washington, DC: 2003.

Call toll free 1-877-4ED-PUBS or order from the Internet to obtain the above document:
<http://nces.ed.gov/timss>

More Resources for TIMSS:

<http://nces.ed.gov/timss/results.asp>

<http://timss.bc.edu/timss1999.html>

Course Format

This course will operate as a working study group. All group members are responsible for defining issues, locating sources, reporting and interpreting information, providing constructive feedback, and so forth. The instructor serves as a lecturer, facilitator, and consultant as well as a study group member. We will meet as a whole class with regular opportunities to consider questions in small groups.

Reading assignments require both comprehension of texts as wholes and close readings of selected passages. To be responsible readers, members should know a text, first, on the author's terms. This means being able to state accurately its thesis, the structure of the argument, the supporting evidence, and the significance, or, place of the text in the study of issues and trends in mathematics education. Being responsible means, secondly, reading texts on one's own terms. It entails arguing with text, applying some aspect of it to a contemporary problem, or borrowing ideas for different purposes. Some people call this "reading across the grain." Dewey talked about appropriating the knowledge encoded in, say, an academic discipline and then reconstructing it for local purposes.

To promote responsible reading and facilitate the development of your paper topic, we will participate in the following activities:

Weekly Queries

Each week, group members will bring a concise summary of a designated assigned reading and one clearly stated question about it. Questions may concern clarification of facts, competing interpretations, methods, structures, and so forth. Indicate, too, how the question came up, was mulled over, and where thinking finally bogged down, if this was the case. Be prepared to present the question for group discussion. Queries are no longer than two (2), typed, double-spaced pages. They should be carefully written and proofread, and they will be handed in at the end of each class.

Informal Presentations

Presentations are an essential aspect of the seminar. Presentations provide you with the opportunity to solicit constructive criticism from your colleagues and me so that you can refine your thinking about the question(s) or idea(s) that you will develop for your final

paper. You are required to do a minimum of 2 presentations. However, you are encouraged to do as many as the course schedule permits. These presentations do not require that you turn in something to me, nor do you receive a grade. ***However, if you do not fulfill this minimum requirement, you will not receive an A in the course.*** The following are guidelines for your presentations:

1. Provide your colleagues with 1 or 2 articles (or relevant task) **at least one week** prior to your presentation. These articles should contain issues that you'd like to discuss with your colleagues so that you can identify or refine the topic for the course paper. Because printing pages and photocopying can be financially burdensome, I ask that you provide your colleagues with photocopies of the materials needed for your presentations. In other words, **do not** send your article via email to your colleagues.
2. You are in charge. Conduct the presentations in ways that will be most beneficial to you. You may want to do a PowerPoint presentation, focus on a video clip as an illustration of the problem, etc.
3. When you do your presentation be sure to contextualize the problems you will be posing. For example, how did your question(s) emerge from the *TIMSS* findings? *It is very important that you engage your colleagues in the ideas presented in the readings. All discussion must be pertinent to the questions you pose and/or ideas contained in the readings.*

These guidelines also apply for the second presentation. If all is going well, your second presentation should exhibit a more refined thinking about your questions. You are encouraged to provide your colleagues with a draft of your final paper as one of the reading assignments, so that they can provide you with constructive feedback.

Annotated Bibliography

The development of your paper will depend on the study of empirical and conceptual works relevant to your topic. As such, you are expected to develop an annotated bibliography. An annotated bibliography should help you streamline your library research and develop a list of citations that will serve you well in future scholarly efforts. Your bibliography should consist of 10 or more citations and should follow APA format. Please see guidelines for the bibliography contained within this syllabus. Please format your bibliography according to the sample entries in the guidelines. Be sure to turn in the draft on the date indicated in this syllabus. ***If you do not fulfill this requirement or turn in the final bibliography, you will not receive an A in this course.***

Final Paper

The final paper is the culmination of your scholarly efforts over the course of the semester. Your paper should have a well-articulated thesis statement or question. Be sure to include a context in which the reader understands how your argument or question follows from the *TIMSS* findings. Scholarly work should support your thesis or argument. The paper should be 15 - 20 pages. Treat the paper as though you intend to submit it to a peer-reviewed journal. The paper should follow the APA publication manual. You are

encouraged to seek assistance for writing labs and seminars. Also, refer to the following websites for guidelines on writing research papers.

<http://webster.comnet.edu/mla/index.shtml>

http://webster.comnet.edu/apa/apa_index.htm

Make sure that you submit the draft on the date indicated in this syllabus. If you do not, you will not receive an A in the course. If you do not turn in the final paper, you will not pass the course.

While presentations provide ongoing feedback on your paper, you are encouraged to seek one-on-one assistance from me. To make an appointment, contact me via email:

mcrocket@uiuc.edu. My office number is 305 and is located in the Education Building.

Tentative Schedule

Week 1, January 24, 2005: Trends and Issues in Mathematics

Introductions

Focus question: What is the “problem” in school mathematics in the U.S.?

Come prepared to discuss the following readings and engage in the following:

Week 2, January 31, 2005: *The Trends in International Mathematics and Science Study* (If I am here.)

Focus question: What is *TIMSS*?

Readings: Course syllabus

<http://nces.ed.gov/timss>, Click on “FAQ About the Assessment” and “FAQ About the Video Study” – download and read this information.

Activity: *Pursuing Excellence*; Library Research Seminar with Nancy O’Brien

If I am NOT here:

Week 2, January 31, 2005: *The Trends in International Mathematics and Science Study* (If I am here.)

Focus question: What is *TIMSS*?

First hour of the class discuss: Discuss the query you prepared for *The Teaching Gap* reading. Discuss the *TIMSS* according the FAQs.

Readings: Course syllabus

<http://nces.ed.gov/timss>, Click on “FAQ About the Assessment” and “FAQ About the Video Study” – download and read this information.

Stigler, J & Hiebert, J. (1999). *The Teaching Gap*, chapters 1-3

Last two hours of class:

Activity: Library Research Seminar with Nancy O’Brien from 5-7. Meet in the Education Library. This is mandatory.

Week 3, February 7, 2005: Mathematics Teaching and Learning in U.S. Classrooms

This may be catch up day, but come to class prepared. Do a query on one of the following readings.

Focus question: What's happening in mathematics classrooms?

Readings: Hoetker, J. & Ahlbrand, W. (1969). The persistence of recitation. *American Educational Research Journal*, 6, 145-167.

Fennema, E. & Romberg, T. (Eds.) (1999). *Mathematics classrooms that promote understanding*. New Jersey: Lawrence Erlbaum Associates. (chapters 1 and 2)

The Teaching Gap, chapters 4-6

Week 4, February 14, 2005: Mathematics Teaching and Learning in U.S. Classrooms

Focus question: What's happening in mathematics classrooms?

Readings

Hoetker, J. & Ahlbrand, W. (1969). The persistence of recitation. *American Educational Research Journal*, 6, 145-167.

Fennema, E. & Romberg, T. (Eds.) (1999). *Mathematics classrooms that promote understanding*. New Jersey: Lawrence Erlbaum Associates. (chapters 1 and 2)

The Teaching Gap, chapters 4-6

U.S. Department of Education, National Center for Education Statistics. *Teaching mathematics in seven countries: Results from the TIMSS 1999 Video Study, NCES (2003-013)*, Chapters 1-3

Activity

Discussion, Examining *TIMSS* vignettes

Week 5, February 21, 2005: History of Mathematics Reform in the U.S.

Focus questions: What are reforms trying to do? Are current reforms really new?

Readings

Cuban, L. (1990). Reforming again, again, and again. *Educational Researcher*, 19(1), 3-13.

Grant, S. G., Peterson, P. L., & Shojgreen-Downer, A. (1996). Learning to teach mathematics in the context of systemic reform. *American Educational Research Journal*, 33(2), 509-541.

Lappan, G. (1997). The challenges of implementation: Supporting teachers. *American Journal of Education*, 106, 207-239.

U.S. Department of Education, National Center for Education Statistics. *Teaching mathematics in seven countries: Results from the TIMSS 1999 Video Study, NCES (2003-013)*, Chapter 4

Activities

Discussion, Examining *TIMSS* vignettes

Week 6, February 28, 2005: Effective Mathematics Teaching

Focus question: What is effective teaching and how do we know?

Readings

Koehler, M. S. & Grouws, D. A. (1992). Mathematics teaching practices and their effects. In D. Grouws (Ed.), *Handbook of Research on Mathematics Teaching and Learning* (p.115-126). New York: Macmillan.

Hiebert, J., Carpenter, T.P., Fennema, E., Fuson, K.C., Human, P., Murray, H., Olivier, A., & Wearne, D. (1996). Problem solving as a basis for reform in curriculum and instruction: the case of mathematics. *Educational researcher*, 25(4), 12-21.

U.S. Department of Education, National Center for Education Statistics. *Teaching mathematics in seven countries: Results from the TIMSS 1999 Video Study, NCES (2003-013)*, Chapter 5

Activity

Discussion, Examining *TIMSS* vignettes, Informal Presentations

Week 7, March 7, 2005: Problem-solving as an Approach to Teaching Mathematics

Focus question(s): What is problem-solving based teaching? What's the rationale for this approach? Is there evidence that this approach is effective or at least promising?

Readings

Fennema, E. & Romberg, T. (1999). *Mathematics classrooms that promote understanding*. New Jersey: Lawrence Erlbaum Associates. (chapters 4 and 6)

U.S. Department of Education, National Center for Education Statistics. *Teaching mathematics in seven countries: Results from the TIMSS 1999 Video Study, NCES (2003-013)*, Chapter 6

Activities

Discussion, Examining *TIMSS* vignettes, Informal Presentations

Week 8, March 14, 2005: Improving Mathematics Teaching

Focus question(s): What approaches have been taken to improving mathematics teaching? Do they work?

Readings

Crockett, M. D. (2002). Inquiry as professional development: Creating dilemmas through teachers' work. *Teaching and Teacher Education* 18, 609-624.

Xu, J. (2003). Promoting school-centered professional development through teaching portfolios: A case study. *Journal of Teacher Education*, 54 (4), 347-361.

Activities

Discussion, Informal Presentations

Week 9, March 28, 2005: Improving Mathematics Teaching

Focus question: What's entailed in improving mathematics teaching?

Readings

Carpenter, T., Fennema, E. & Franke, M. (1996). Cognitively guided instruction: A knowledge base for reform in primary mathematics instruction. *The Elementary School Journal*, 97(1), 3-20.

An, S., Kulm, G. & Wu, Z. (2004). The pedagogical content knowledge of middle school, mathematics teachers in China and the U.S. *Journal of Mathematics Teacher Education*, 7, 145-172.

Fennema, E. & Romberg, T. (Eds.) (1999). *Mathematics classrooms that promote understanding*. New Jersey: Lawrence Erlbaum Associates. (chapter 9)

Activities

Discussion, Informal Presentations

Week 10, April 4, 2005: Mathematics Teaching in Other Countries

Focus question: What do we know about mathematics teaching in other countries?

Readings

U.S. Department of Education, National Center for Education Statistics. *Teaching mathematics in seven countries: Results from the TIMSS 1999 Video Study, NCES (2003-013)*, (Review the findings.)

The Teaching Gap, chapter 7

Activities

Discussion, Informal Presentations

Week 11, April 11, 2005: Classrooms that Promote Understanding

Focus question: How do we do classrooms that promote understanding?

Readings

The Teaching Gap, Chapters 8-10

Fernandez, C. (2002). Learning from Japanese approaches to professional development: The case of lesson study. *Journal of Teacher Education*, 53 (5), 393-405.

Fennema, E. & Romberg, T. (Eds.) (1999). *Mathematics classrooms that promote understanding*. New Jersey: Lawrence Erlbaum Associates. (chapter 9)

Activities

Discussion, Informal Presentations

Week 12, April 18, 2005: Missing Questions

Focus question: What's missing from the *TIMSS*?

Readings

Fennema, E. & Romberg, T. (1999). *Mathematics classrooms that promote understanding*. New Jersey: Lawrence Erlbaum Associates. (chapter 3)

Activities

Discussion, Informal Presentations

Week 13, April 25, 2005: Dilemmas

Focus question: Where do we go from here?

Activities

Discussion, Informal Presentations

Week 14, May 2, 2005: Reprise

Activities

Discussion, Informal Presentations

Important Due Dates to Remember:

Drafts for Paper and Bibliography due on **April 4, 2005.**

Finals for Paper and Bibliography due on **May 10, no later than 5 pm.**

Please submit hard copies only.

Grading Policy

A letter grade (A, B, C, etc.) will be determined on the basis of a composite judgment that considers attendance, thoughtful participation, weekly queries and the quality of the final annotated bibliography and journal length paper required for this course. If you anticipate that attendance will be a problem or if it becomes a problem, it is recommended that you drop this course. It is expected that all requirements for the course are met and the assignments are turned in *no later* than the dates indicated in this syllabus.

Academic integrity is an essential aspect of the scholarly endeavor. Be sure that you understand what this means with respect to your studies at the University of Illinois. Please refer to the *Code of Policies and Regulations Applying to All Students, Rule 33—Academic Integrity*. Violation of this code will result in sanctions in accordance with University regulations.

How to Prepare an Annotated Bibliography

What is an annotated bibliography?

A concise definition:

An annotated bibliography is a list of citations to books, articles, and documents. Each citation is followed by a brief (usually about 150 words) descriptive and evaluative paragraph, the annotation.

An elaborated definition:

Annotations may consist of all or part of the following items, depending on the task.

A description of:

1. the content (focus) of the item;
2. the usefulness of the item;
3. limitations that the item may have, e.g., grade level, timeliness etc.;
4. your reaction to the item.

An evaluation of:

1. the methods (research) used in the item;
2. reliability, validity, generalizability of the findings;

A discussion of:

1. the author's background;
2. any conclusions the author(s) may have made

What is the purpose of an annotated bibliography?

Depending on the assignment the annotated bibliography may serve a number of purposes. Its most common purpose is to inform the reader of the relevance, accuracy, and quality of the sources cited. Other purposes include but are not limited to the following: a review of the literature on a particular subject; an illustration of the quality of research that you have done; a set of examples of the types of sources available; a description of other items on a topic that may be of interest to the reader; evidence that the subject requires further research.

What does the annotated bibliography look like?

Write and arrange the bibliographic entries (citations) just as you would any other bibliography. Title the page "Annotated Bibliography." Arrange citations alphabetically by the first word, which is typically the author's last name. Your instructor may have his/her preferred style. However, there are a number of crib sheets (both on the Internet and in print form) with the popular styles, such as APA, MLA, Chicago, etc. The annotation follows the bibliographic information or may skip one or two lines depending on the style manual that is used. The annotation should be succinct, conveying the information most relevant to the bibliography's purpose.

Sample Annotated Bibliography Entry for A Journal Article

The following examples use the APA format for citations:

Goldschneider, F. K., Waite, L. J., & Witsberger, C. (1986). Nonfamily living and the erosion of traditional family orientations among young adults. *American Sociological Review*, *51*, 541-554.

The authors, researchers at the Rand Corporation and Brown University, use data from the National Longitudinal Surveys of Young Women and Young Men to test their hypothesis that nonfamily living by young adults alters their attitudes, values, plans, and expectations, moving them away from their belief in traditional sex roles. They find their hypothesis strongly supported in young females, while the effects were fewer in studies of young males. Increasing the time away from parents before marrying increased individualism, self-sufficiency, and changes in attitudes about families. In contrast, an earlier study by Williams cited below shows no significant gender differences in sex role attitudes as a result of nonfamily living.

Sample Annotated Bibliography for a Book

Sewell, W. (1989). *Weaving a program: Literate programming in WEB*. New York: Van Nostrand Reinhold.

Sewell explains the code language within these pages including certain lines of code as examples. One useful idea that Sewell uses is to explain characters and how they work in the programming of a Web Page. He also goes through and describes how to make lists and a title section. This will be very useful because all Web Pages have a title section. This author also introduces Pascal, which I am not sure if I will include in my manual, but after I read more about it I can decide whether this will be helpful to future users.

This book will not be the basis of my manual but will add some key points, which are described above.

A good deal of the information here has been lifted from the following websites:

<http://www.library.cornell.edu/okuref/research/skill28.htm>

<http://www.crk.umn.edu/library/links/annotate.htm>