



Cameras in the Classroom: International Video Survey Examines Mathematics Teaching Practices in Three Countries

By James Stigler and James Hiebert

A videotape study of classrooms in the United States, Germany and Japan reveals differences in what and how mathematics is taught to eighth graders.

How do U.S. mathematics teaching practices compare with those in other countries? Are international teaching practices in line with the recommendations of U.S. education reform?

These are questions addressed by the Videotape Classroom Study, a video survey of eighth-grade mathematics lessons in Germany, Japan, and the United States. Funded by the U.S. Department of Education's National Center for Education Statistics and the National Science Foundation, the video study is the first attempt to collect videotaped records of classroom instruction from nationally representative samples of teachers.* Based on the belief that a better understanding of the processes of classroom instruction in different cultures will contribute to efforts to improve student learning, the study had four goals:

- To provide a rich source of information regarding what goes

on inside eighth-grade mathematics classes in three countries;

- To develop objective observational measures of classroom instruction to serve as quantitative indicators, at a national level, of teaching practices in the three countries;
- To compare actual mathematics teaching methods in the U.S. and the other countries with those recommended in current reform documents and with teachers' perceptions of those recommendations;
- To assess the feasibility of applying videotape methodology in future wider-scale national and international surveys of classroom instructional practices.

What Was the Process?

The study sample included 231 eighth-grade mathematics classrooms—100 in Germany, 50 in

Japan, and 81 in the United States. One lesson was videotaped in each classroom at some point during the school year. Tapes were encoded and stored digitally on CD-ROM and were accessed and analyzed using multimedia database software developed especially for this project. All lessons were transcribed, and then analyzed on a number of dimensions by teams of coders who

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*The Video Tape Classroom Study is part of the Third International Mathematics and Science Study (TIMSS), a comparative study of mathematics and science education in 41 countries, focusing on student achievement and its educational context. The text of this article is adapted from the TIMSS web site, www.ed.gov/NCES/timss/video.

CONNECTIONS

Publisher

Urban Education Studies Center
Graduate School of Education
& Information Studies (GSE&IS)
UCLA

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Primary Resources Enliven Classroom Lessons

Primary sources such as personal letters, diaries, photographs, games, maps and other artifacts provide children entry into a subject that no textbook or lecture can. Since 1993 Seeds University Elementary School and the UCLA University Research Library have provided K-12 teachers an opportunity to do research in the library's Special Collections and use primary sources to create original lessons in reading, writing and social studies. By sharing with students the excitement of, for example, reading correspondence between George Washington and Benedict Arnold, comparing 18th-century Cinderella stories to the present-day version seen in movie theaters, tracing the journey of a young pioneer woman, or learning from ancient cookbooks that Romans once ate parrots, flamingos and rats, teachers in the program demonstrate the joy of seeking resources and inspire students to become active, creative learners who make discoveries of their own.

The Institutes

The Primary Resources Summer Institute has three components. The first, an introduction to research methodology using primary resources, is taught prior to the institute week. This Saturday session enables teachers to learn their way around the University Research Library and the Department of Special Collections. It also provides an opportunity to make a final selection of a subject and begin searches for applicable materials. Library personnel teach research methodology and assist teachers in their research efforts. UES teacher Ruthellen Moss coordinates the program and guides teachers in developing lessons.

Later in the summer teachers spend a week in residence at the Department of Special Collections, where they examine the materials they have selected for their projects and commit their ideas to paper using a format developed at UES. At the end of the research week the teachers make oral presentations to the entire group. Teachers describe their research topics, present ideas for introducing them into the classroom and invite critiques.

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Mathematics Survey

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were native speakers of the three languages. Analyses focused on the content and organization of the lessons, as well as on the instructional practices teachers used during the lessons. We also collected supplementary materials (e.g., copies of textbook pages or worksheets) deemed helpful for understanding the lessons.

Because teachers knew when the taping was to take place, we knew they might attempt to prepare in some way for the event. In order to mitigate any bias that might be caused by their preparation, we gave teachers a common set of instructions. We told them that our goal was to see what typically happens in the mathematics classrooms of their country, so we wanted to see exactly what they would have done had we not been videotaping.

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Practicing Research and Researching Practice: The Development and Assessment of a Two-Way Bilingual Program for Young Children

By Deborah Stipek, Rosaleen Ryan & Raul Alarcón

A collaboration between researchers and practitioners to develop a two-way bilingual program for 4- to 8-year-olds at Seeds University Elementary School serves as a model of school improvement.

In a blurring of the lines between research and practice, teachers and researchers at Seeds UES have been working together for two years to design, implement, assess, and fine-tune an English-Spanish, two-way instructional program for children ages 4-8. The collaboration has resulted in a program that we believe is more sensitive to the needs of children and makes better use of existing research than would have been developed if teachers or researchers had worked alone. It also offers a model for how teachers can assess their classroom practices using similar methods.

“From the start, researchers were involved in creating the UES program.”

Designing the Program

From the start, researchers were involved in creating the UES program, helping to design it and to guide some of the hundreds of decisions that had to be made by sharing with teachers what has been learned from past research.

This is not to say that all programmatic decisions were based on research. Some decisions reflected beliefs and values shared by the teachers and the school community. For example, the decision to develop a program that would maintain and develop Spanish-speaking children’s native language was in part based on research suggesting the advantages of this

approach for children’s learning, and in part on the belief that maintaining proficiency in Spanish and links to native culture has value for individuals and for our society. We decided to create a *two-way* program in

part because there is research evidence supporting the effectiveness of this strategy, and in part because the school community believed in the value of second-language learning and hoped that it would promote better understanding and appreciation of

different cultures and languages among English-speaking children. Other decisions—such as strategies for involving parents, for including multiple perspectives in the curriculum, and for incorporating technology into the program—were guided by teachers’ experience and consultations with the larger school community.

The Program

In describing the program we must stress its dynamic quality. For purposes of stability and continuity

for our students, we do not make major changes during the year.

However, as our informal observations and systematic assessments provided new information about the effects of the

program on children’s learning and development, we continued to make minor, and occasionally major, adjustments.

Our classrooms include a mix of native Spanish- and English-speaking children, with a teacher and an aide who are fluent in both Spanish and English. During the year in which we did the formal assessment of the program, described below, 4-year-old children were in one classroom; a second classroom included children ages 5-6 (equivalent to kindergarten); and a third included children ages 6-8 (equivalent to first and second grade). Because both Spanish and English were used and because one of the goals of the program was to develop language and literacy in both languages for all children by the time they leave UES in 6th grade, we called it the “Learning in Two Languages” (LITL) program.*

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“Some decisions reflected beliefs and values shared by the teachers and the school community, others were guided by research.”

* The LITL program is being extended as the children advance through UES. The goal of the program at this point is for children to develop language and literacy skills in their native language—i.e., in English for dominant English speakers, in Spanish for dominant Spanish speakers—while they begin to acquire a second language.

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What Did We Find?

In the analyses completed thus far, a number of cross-cultural differences have emerged. (Note that because these findings are based on national averages, there will be many teachers in each country who are not accurately characterized here.)

There appears to be a clear distinction between the script that Japanese teachers use to generate lessons and those that most German and U.S. teachers use. These different scripts follow from different instructional goals and are probably based on different assumptions about the role of problem solving in the lesson, about the way students learn from instruction, and about the proper role of the teacher.

U.S. and German lessons tend to have two phases: an initial acquisition phase and a subsequent application phase. In the acquisition phase, the teacher demonstrates and/or explains how to solve an example problem. The explanation might be purely procedural (as most often happens in the U.S.) or may include development of concepts (more often the case in Germany). Still, the goal in both countries is to teach students a method for finding the correct solution to the example problem(s). In the application phase, students practice solving examples on their own while the teacher helps individual students who are experiencing difficulty.

In Japanese lessons, problem solving comes first, followed by a time in which students share the

solution methods they have generated and jointly work to develop explicit understandings of the underlying mathematical concepts. Whereas students in the U.S. and German classrooms must follow the teacher as she leads them through the solution of example problems, the Japanese students have a different job: to invent their own solutions, sometimes independently, often in pairs, then reflect on those solutions in an attempt to increase understanding.

In addition to these differences in goals and scripts, we also found differences in the coherence of lessons in the three countries, the greatest of which were between U.S. lessons and Japanese lessons. U.S. lessons were

found to be less coherent than Japanese lessons by several criteria.

First, American teachers switched from one topic to another within lessons more than Japanese teachers. American lessons contained significantly more topics than did Japanese lessons, and significantly more topic segments than both Japanese and German lessons.

Second, the changes from topic to topic or from one segment to another in American lessons often were not linked together by the teacher. Japanese teachers were significantly more likely to provide explicit links or connections between

different parts of the same lesson.

Third, American teachers devoted significantly more time during the lesson to irrelevant diversions than did German or Japanese teachers. Depending on when these diversions occur, they can weaken the coherence of the lesson.

Finally, American lessons were more frequently interrupted by outside events, such as PA announcements or visitors. This occurred in 28 percent of American lessons, 13 percent of German lessons, and zero percent of Japanese lessons.

Another cross-national difference was in the role homework played in the lessons. If homework was attended to during the lesson it happened in one of two ways: The class might go over and share the results of homework done for the day's lesson; or, the students might be given time to begin working on their assigned homework for the next day.

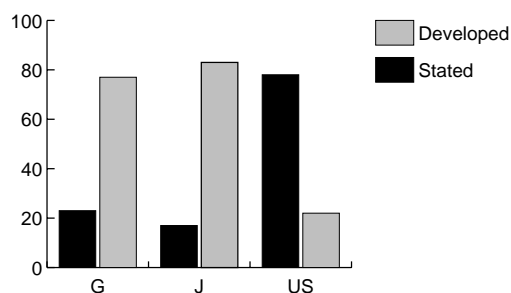
Japanese students never worked on the next day's homework during class and rarely shared homework results. Both German and American students shared homework frequently, but only American

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“We told teachers that we wanted to see exactly what they would have done in their classrooms had we not been videotaping”

Figure 1

Average percentage of topics in each lesson that contained concepts that were developed vs. only stated



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students spent time in class actually working on the next day's homework. When we calculate the total percentage of time during the lesson that was devoted to assigning, working on, or sharing homework we get a similar result: Only two percent of lesson time in Japan involved homework in any way, compared with eight percent in Germany and 11 percent in the United States.

The Kind of Mathematics Taught

It is not possible, a priori, to say that one mathematical topic is more complex than another. However, we can judge how advanced a topic is based on its placement in mathematics curricula around the world. Compared internationally, the mathematical content of U.S. lessons was at a seventh-grade level on average, whereas German and Japanese lessons fell at the high eighth- or ninth-grade levels.

In all three countries most mathematics lessons included some mixture of concepts and applications of those concepts to solving problems. How concepts were presented, however, varied a great deal across countries. They might simply be

stated, as in: "the Pythagorean Theorem states that $a^2 + b^2 = c^2$," or students might derive and develop them over the course of the lesson, with the teacher guiding analysis of a problem and asking questions.

Figure 1 shows the percentage of topics in each lesson that contained concepts that were developed vs. only stated. More than three-fourths of German and Japanese teachers developed concepts when they included them in their lessons, compared with one-fifth of U.S. teachers.

American students lacked opportunities to construct proofs and reason deductively. None of the U.S. lessons included proofs, whereas 10 percent of German lessons and 53 percent of Japanese lessons did.

In a separate analysis of 30 lessons from each country conducted by a group of experienced college mathematics teachers, 62 percent of Japanese lessons were found to include deductive reasoning, compared to 21 percent in Germany and zero percent in the U.S.

"In Japanese lessons, problem solving comes first, followed by a time in which students share the solution methods they have generated."

distinctly different. Three types of work were coded in the video study: Practicing Routine Procedures, Applying Concepts to Novel Situations, and Inventing New Solution Methods/Thinking.

As shown in Figure 2, approximately 90 percent of student working time in Germany and the U.S. was spent in practicing routine procedures, compared with 41 percent in Japan.

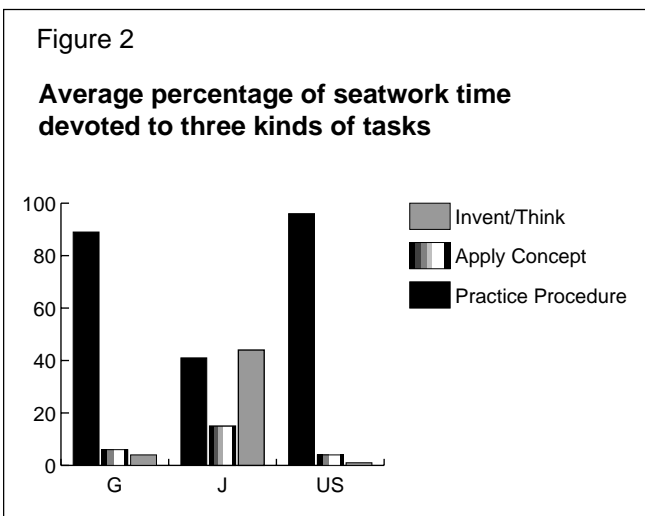
Japanese students spent nearly half of their time inventing new solutions and engaging in conceptual thinking about mathematics.

We also were interested in the frequency with which students were exposed to alternative solution methods, either presented by the teacher or generated by the students. Forty percent of Japanese lessons contained student-generated alternative solution methods, a percentage more than twice as high as that found in Germany and the U.S. The number of teacher-presented alternative solution methods did not differ significantly across countries.

The Way Teachers View Reform

Much effort has been put into the reform of mathematics teaching in the U.S. in recent years. Numerous documents—such as the National Council of Teachers of Mathematics Curriculum and Evaluation Standards and the NCTM Professional Standards for Teaching Mathematics—encourage teachers to

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When we examined the kind of work students engaged in during the lesson we found a strong resemblance between Germany and the U.S., with Japan looking

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For children in the youngest class, teachers conducted morning meetings in Spanish one week and English the next. Children were assisted in the acquisition of literacy skills and reading in their primary language. Most of the instructional program involved small-group work in centers, which was done in students' native language.

Children ages 6-8 received

literacy and math instruction in their primary language. Sheltered English was used in other content areas, such as science and social studies, with children working in both single-language and mixed-language groups. Native English speakers received direct Spanish-language instruction for a minimum of 30 minutes each day in the context of content areas such as fine arts, physical education, and health. Primary Spanish speakers also received daily directed ESL instruction.

The Study

In the design and initial implementation of the program, researchers served a consultative role. For the systematic assessment that was next launched, the roles reversed. Teachers advised researchers about what they needed to know to make programmatic and instructional decisions. They also reviewed (and even created) assessment measures and helped interpret findings.

The study compared three groups of students: (1) native Spanish speakers in the LITL

program (29 children), (2) native English speakers in the LITL program (45 children), and (3) native English speakers in English-only classrooms (45 children). The study was designed first to provide information that teachers in this particular context could use to improve the effectiveness of their program in

achieving its goals. It was also designed to provide information that could be used in other school settings to

guide decisions about how best to meet the educational needs of limited or non-English speaking students.

The design did not allow us to compare the relative value of our program versus another model for native Spanish speakers, but it did allow us to determine (1) whether native Spanish speakers were learning at the same rate as native English speakers, and (2) the costs and benefits for English speakers of instruction involving a second language.

Children were assessed at the beginning and the end of the year on:

- primary language skills (Pre-LAS),
- second language skills (Pre-LAS and SOLOM),
- literacy skills in their primary language (e.g., identification of letters, words, beginning and ending of a story; reading sight words, comprehension of a story),
- math skills in their primary language,
- self-perceptions of academic competencies, and
- feelings about school.

We also did observations to help us explain differences in the

program's effects on children, if we found them. Each child was observed approximately 24 times in a three-month period. Each observation was for a 4-minute interval, during which the observer recorded the activity in which the child was engaged, the language spoken to and by the target child, and the child's level of engagement, affect, and participation (e.g., volunteering to answer questions in a group lesson).

What Did We Learn?

Our goals in collecting the above information were to determine overall learning gains and identify any differences that existed among the three groups of children. We also wanted to determine whether the results were different for younger (4- to 6-year-old) and older (6- to 8-year-old) children.

Literacy and Math—Gains in literacy and in mathematics were the same for all three groups of younger children. As shown in *Figure 3*, among the older children, native Spanish speakers made the same gains in literacy as native English speakers. In mathematics there was no difference in skill gains between native Spanish speakers and native English speakers in the LITL classrooms, but both groups gained less than native English speakers in the English-only classrooms.

Primary Language Skills—Native Spanish speakers' Spanish language skills improved substantially over the course of the year. Native English speakers' English language skills did not show an improvement on the measure used because they were near the top of the scale at the beginning of the study.

Second Language Skills—Analyses of the Pre-LAS indicated that the younger native Spanish speakers made more progress in their English-language skills than the older native Spanish speakers. This

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occurred despite the finding that the teacher spoke English to older native Spanish speakers (76% of the observations) more than to younger native Spanish speakers (56% of the observations).

Perceptions of Competence and Feelings About School—Among younger children there were no group differences in self-perceptions of their academic competence or feelings about school. For all groups average scores on the assessments were high: 3.44 for perceptions of competence and 4.35 for feelings about school (on a scale of 1-5). There was one fairly dramatic difference in the older children's reports about how they felt about school. At the beginning of the year all three groups of the older children had fairly positive (average of 4.29) ratings. At the end of the year the native English speakers' ratings declined slightly, but the native Spanish speakers' reports became even more positive (average of 4.69).

Observations—Results of the observations indicated that the native Spanish speakers were as engaged in the instructional program as native English speakers, and some indicators suggested even higher engagement. For example, native Spanish speakers had the highest average engagement rating (2.12 on a 3-point scale, compared to 2.07 for native English speakers in the LITL program and 1.95 for native English speakers in the English-only program). And in the classrooms with the older children, native Spanish speakers were observed gazing away and "wiggling around" during teacher-directed activities significantly less than native English speakers.

Summary—In summary, the Spanish-speaking children were as engaged in the instructional program and fared as well academically as the English-speaking children. The older native Spanish speakers developed even more positive feelings about school, although the average on this measure was high for all children.

Costs and Benefits of Bilingual Classrooms for Native English-Speaking Students

For the youngest native English-speaking children there was no evidence of either costs or benefits associated with being in the LITL program. The benefit for the older children was in some, albeit modest, proficiency they developed in a second language. The differential gains in literacy and math, along with the observation data, suggest what may seem obvious—that the more time devoted to a subject, the greater children's skill gains. Following are some of the findings that led to these conclusions.

There were no differences in the gains made by native English speakers in the LITL and English-only classrooms in English language skills or in children's perceptions of their academic competencies or feelings about school. And the younger native English speakers in the LITL and the English-only classrooms made the same gains in literacy and in math.

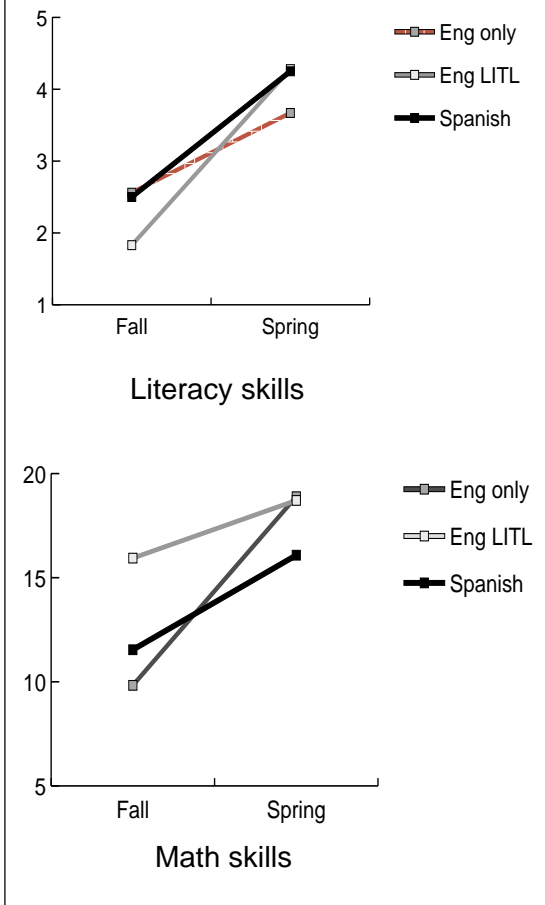
For the older children, there were signifi-

cant differences in gains made in math and literacy skills. Native English speakers in the LITL program made significantly greater gains in their literacy skills and lower gains in their math skills than native English speakers in the English-only classroom (see *Figure 3*). The observation data help explain these differences. Children in the one English-only classroom for 6- to 8-year-olds that was included in the study were observed engaged in math activities three times as often as children this age in the LITL classrooms; they spent significantly less time in literacy activities. These differences may have occurred

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Figure 3

Literacy and Math Gains Among Older Children



Primary Sources

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The project's third component occurs once the teachers return to their schools. Integrating feedback received from their colleagues, they create final versions of their units.

The Primary Resources Summer Institute, held each year, is evolving and growing. All K-12 teachers are eligible to apply for participation. Applications are accepted each spring. The following are summaries of a sampling of classroom units created in past institutes. For more information on these and other units, call the UESC at (310) 825-2623. For information on the program, contact Sharon Sutton at UES at (310) 825-1325.

Sample Lessons

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The Boston Massacre: What Really Happened? — *by Robert Berger, 5th-grade teacher, La Cañada Elementary School, La Cañada School District*

The Boston Massacre in March 1770 was a key event leading to the American Revolution. Boston agitators such as Paul Revere and Samuel Adams used the "Massacre" to stir public outrage and pressure British troops to leave the city. John Adams, in defending the accused soldiers during their trial for murder, shifted the blame for the incident away from the troops and toward the citizens of Boston.

Through the use of primary source materials such as engravings, trial transcripts, speeches and letters, this unit helps children gain a deeper understanding of the Boston Massacre and the tremendous emotions it aroused at the time. These materials help students see the events leading to the Revolutionary War as a dramatic story in which each effort

by the British to impose their will on the colonies resulted in a strong counter-revolution.

Primary Sources

- Paul Revere's engraving of the Massacre from *The Bloody Massacre: The Revere Engraving*, a special reprint of the engraving, produced by the Imprint Society in Boston, 1970.
- John Adams' summation speech to the jury from the second Boston Massacre trial found in *The Trial of the British Soldiers*, a trial transcript printed by William Emmons, Boston, 1824.
- Samuel Adams' letter commenting upon the verdict of the second Boston Massacre trial from *The Writings of Samuel Adams*, published by G.P. Putnam, New York, 1906.

Sample Activities

Begin by reading pages 249-250 in the text *America Will Be*. Explain that this is a modern viewpoint on the Massacre and represents our "best guess" about what happened.

Next, view a 5-minute video segment from A&E's "American Revolution" on the Massacre. The segment is a re-enactment of the event with narration.

Give students a copy of Paul Revere's engraving of the Massacre and the poem that accompanies it. As they study the engraving, ask students the following questions:
—Explain some differences you notice between the video's depiction of events and that of the engraving.
—How do you feel about the British soldiers when you look at the engraving? Why might Revere want you to feel this way?
—Even if Revere knew he had created an inaccurate picture of what happened, why might he still want as many people as possible to see his artwork?

After studying the artwork, ask students to write a brief response to the video segment and the engraving in a journal. They should focus on the difference between the two sources.

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Journalists and Journalism: Voices From the Past, Lessons for the Future

— *by Adrienne Mack, mentor teacher, Birmingham High School, Van Nuys School District*

This unit addresses the California Framework goals of (1) giving students opportunities for participation and reflection on the responsibility of citizens in a free society, (2) exercising critical thinking skills, (3) incorporating a multi-cultural perspective to enrich students' lives and understanding of the diverse fabric of the United States, and (4) developing socio-political literacy. In keeping with these goals, the lessons are designed to demonstrate to high school journalism students the importance of journalism and journalists, the purpose of newspapers, the permanence of the written word, and the possibility of a single voice making a difference in the community. Similarities and differences between journalists and newspapers from the 1920s to the present are explored.

Primary Sources

- Oral histories by journalists Verne Dyson, Arnold Larson, and Carey McWilliams.
- *The Worker*, 1943-1947
- *The Chronicle*, April 11, 1947
- *Chicago Daily Tribune*, April 11 & 12, 1947
- *The New York Times*, April 11 & 19, 1946
- *The Pittsburgh Courier*, January 4 & April 19, 1947
- *UCLA Daily Bruin*, April 11, 1947
- *The London Times*, April 12, 1947

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Primary Sources

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Sample Activities

Each student will build an advertisement portfolio using ads from every section of the newspaper as well as representative ads from three magazines appealing to different audiences. Each entry should include:

- A copy of the ad
- Legend: date, title and section of publication in which the ad was found
- Discussion (in full sentences): What is being sold? How is the advertiser attempting to appeal to the audience? Why does the ad appear in that section of the newspaper or in that magazine? Additional comments as appropriate.

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Manzanar: Through Student Eyes — by Annette Janeway, 8th-grade teacher, Santa Fe School, Baldwin Park Unified School District

On December 7, 1941, the Japanese staged a surprise attack on Pearl Harbor. Two months later President Roosevelt signed Executive Order 9066, giving the U.S. War Department authority to define military areas in the western states and to exclude from them anyone who might threaten the war effort. By August of 1942, 110,000 people of Japanese ancestry had been moved from the West Coast to ten inland detention camps. Through discussion and writing, this unit teaches students about the experience of Japanese American internment during World War II. Students use primary sources to relate the themes of tolerance and prejudice to the era and write about the Manzanar Internment Camp in a variety of genres (i.e., journals, interviews, short reports, RAFT writing, speeches).

Primary Sources

- Evacuation Notice; Instructions to all persons of Japanese ancestry.
- Photographs from the Manzanar High School yearbook, Valediction 1945.
- Student essays written during internment at Hunt, Idaho, May 1942. “The War! How it Affects Me?” “What I Must Do To Make This A Better World To Live In” “A Better World” and “How the War Has Affected Me”.
- Autobiographical literature relating to the era.

Sample Activities

Before the lesson, students make a time line from the 1920s to the present. Students should ask a person born during the 1930s or earlier to list three major events in his or her life. This person, and his or her information, should be included in the time line.

Introductory Activity: Give students 10 minutes to write on the following question: “If the United States were attacked and went to war right now, how might your life be different?”

Show document #1 (Evacuation Notice). Lead class discussion on how students’ lives might change during a war, as it did for thousands of Japanese Americans in 1942. Facts about the internment years may be included.

Have students add the following dates to their personal time lines: 1939 - 1945—World War II; 1941—Attack on Pearl Harbor; 1942 - 1945—All Japanese not in military service ordered to mandatory exclusion in internment camps; 1945—Atom bomb dropped on Hiroshima; 1988—Official apology to internees

These events happened during the lifetime of the people students interviewed for their time lines. Have students interview each person

again, asking: “What do you remember about the Japanese American Internment?”

Point out that there were two major reasons the United States government made the decision to open internment camps. The United States was involved in World War II and had been recently bombed by the Japanese at Pearl Harbor. Many felt the West Coast was at risk from the internal threat of spy activity. Secondly, the social climate was becoming increasingly intolerant of Japanese Americans. The United States’ stance, therefore, was one of protection from Japanese Americans.

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Leo Politi and the Children of El Pueblo de Los Angeles Now and Long Ago — by Raul Alarcón, 1st- and 2nd-grade teacher, Seeds University Elementary School, UCLA

The people who make up our Los Angeles community have varied and interesting life experiences that can contribute to our greater understanding and appreciation of an interdependent community. Our parents, grandparents, and other ancestors have made a difference in our lives. Through literature and family histories we can have a greater understanding and appreciation of these contributions in our own lives and in meeting the needs of our community.

In this unit students interview their grandparents and other family members to gain a greater understanding of community life when they were children and how their experiences have influenced the lives of students today; they also compare and contrast the diverse needs of their present community with the community of long ago. Using children’s books by Leo Politi, children understand and appreciate

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because the teacher in the English-only classroom was particularly focused on developing innovative mathematics practices that year. It is also possible that mathematics instructional time was reduced somewhat in the LITL classrooms to allow time for second language instruction.

The older native English speakers in the LITL program developed some skill in Spanish (from an average score of 9.12 in the fall to 11.53 in the spring on the SOLOM). But the gains were modest, and both the SOLOM and the Pre-LAS showed that the younger native English speakers made almost no progress in Spanish. The observation data indicated that teachers used Spanish or a mix of Spanish and English with native English speakers in the younger classrooms more (27% of the observations) than in the older classrooms (6%). Apparently the older children were able to learn more Spanish with less direct input.

Fine-Tuning

The results of this assessment support, overall, the value of the two-way bilingual program that we developed at UES. Native Spanish-speaking children were well served by the program, and native English-speaking children were given an opportunity to develop a second language without cost to their academic skills in other domains.

Our findings also suggested, however, the need to make adjustments in some of the instructional approaches—which we already have made. First, the amount of Spanish spoken in the LITL classrooms has increased in hopes of increasing the Spanish skill gains of the native English-speaking children. The amount of time devoted to math-

ematics instruction has been increased in the older LITL classrooms, and literacy instruction has increased in the older English-only classroom. The research findings were very helpful in revealing strengths and weaknesses in the program and guided us in making these improvements.

To be sure, teachers at UES have many sources of information about the effect of their instructional approaches on their children's learning and feelings about themselves and school. Many of the changes they make are based on their own direct observations; suggestions made by administrators and colleagues; new approaches they learn at workshops and conferences, and from books, journals, and over the Internet; and feedback from parents and the children themselves. As this study illustrates, however, systematically administering tests of children's achievements and recording and analyzing their scores has considerable value in guiding efforts to improve educational programs.

Anyone Can Do This

Not every teacher has a researcher available to assess systematically the effects of his or her educational program. In this way, UES is unusual. But assessment tools are available and teachers in any school can use them periodically to check their students' progress. Average scores are easy to calculate, and figures showing changes in these averages over time are easy to draw. It is also easy to calculate average scores by subgroups. Are girls and boys making the same progress in mathematics? Are children who began the year with poor reading skills catching up?

Not every UES program is assessed as thoroughly as the LITL program. But this process of developing instructional approaches that are based on the best available

scientific evidence, assessing their effects on children's learning, fine-tuning, and re-assessing, is a process that applies, albeit usually less formally, to every instructional program. This never-ending process helps us address our students' constantly changing needs to meet the challenges of a constantly changing society.

For Further Information

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This study was conducted with considerable assistance from Jaime Calderón, Laurette Cano, Susan DeBlasio, Judy Ferkel, Ron Gallimore, Kristin Geiser, Claude Goldenberg, Margaret Heritage, Karen Lee, Nellie Rios, Deanna Staake, and Colleen Vail. For copies of the measures used in the study write or send e-mail to the UESC.

Primary Sources

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the lives of children who make up the diverse community of Los Angeles.

Primary Sources:

- Photographs of Mexico: Market Day, University of California, Los Angeles, University Research Library, Department of Special Collections.
- Politi, Leo, *Bunker Hill, Los Angeles: reminiscences of bygone days*, Charles Scribner's Sons, 1964.
- Politi, Leo, *The Nicest Gift*, Charles Scribner's Sons, 1973.
- Politi, Leo, *Pedro, el angel de la Calle Olvera*, Charles Scribner's Sons, 1946.
- Politi, Leo, *Pedro, the angel of Olvera Street*, Charles Scribner's Sons, 1946.
- Politi, Leo, *Tales of the Los Angeles Parks*, Charles Scribner's Sons, 1966.

Sample Activities

Introduce students to the work of Leo Politi. Explain to them that he was an author who wrote children's books when their grandparents were children.

Show the children the photo from Politi's book *Bunker Hill, Los Angeles: reminiscences of bygone days*. Discuss how the community in that photo differs from our community today.

Create a class Venn diagram to show similarities and differences in these two communities.

Read Politi's book *Mr. Fong's Toy Shop*. Discuss the story and the illustrations. Are they different from the stories children are familiar with today? Why?

What are some of the cultural celebrations that students participate in in their community? How do people from diverse cultures contribute to their communities and the way people live?

Design a mural of the varied festivals celebrated in different communities.

Introduce the story, *The Nicest Gift*, by Leo Politi. Have students predict what the story is about by writing in their journals.

Take children on a field trip to Olvera Street (in Los Angeles) or other ethnic neighborhood.



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Mathematics Survey

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change the way they teach and point to some features of preferred instruction.

When we looked at the lessons with these recommendations in mind, we found that the Japanese lessons in some ways came closer to implementing the spirit of reform than did American lessons. For example, Japanese students were asked to solve problems, generate alternative solution methods and explain their thinking more often than American students. It is also true, however, that Japanese lessons followed a distinct pattern that cannot be labeled as either traditional or reform-minded in the American sense. We saw, for example, that they were more likely to emphasize abstract, symbolic problems over real-world hands-on problems and they almost never involved calculators.

Most of the U.S. teachers who participated in our study believed that they were implementing current reform ideas in their classrooms. When asked specifically to evaluate their videotaped lessons, almost three-fourths of the American

teachers rated them as reasonably in accord with current ideas about the teaching and learning of mathematics. They were more than twice as likely to respond this way than either the Japanese or the German teachers. But when asked to justify their responses, the vast majority of these American teachers referred to surface features, such as the use of manipulatives or cooperative groups, rather than to the deeper characteristics of instruction, such as the depth of understanding promoted in their students.

The findings of the video study suggest that written reports disseminated to teachers and the brief workshops teachers are given to assist them may have little impact on practices in the classroom. One reason for this may be that teachers do not have widely shared understandings of the meaning of such terms as “problem solving,” leading to idiosyncratic interpretations in the classroom. Video examples of high quality instruction tied to descriptions of what quality instruction looks like may help, in the future, to address this problem.

Explore the Lessons

The unique advantage of the Videotape Classroom Study is the opportunity it affords to see what teaching looks like in different cultures. In addition to a CD-ROM available from the National Center for Education Statistics, a computer video version of lessons from the three countries studied can be accessed through the TIMSS web site at: www.ed.gov/NCES/timss/video. Or contact the National Center for Education Statistics, 555 New Jersey Avenue, Room 402A, Washington, DC 20208. (202) 219-1395.

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