

LACTE FOLLOW-UP CASE STUDY

EXECUTIVE SUMMARY

Introduction to LACTE

The Los Angeles Collaborative for Teacher Excellence (LACTE), established in 1995 and now all but completed, is one of the Collaboratives for Excellence in Teacher Preparation (CETP) funded by the National Science Foundation. Designed to enhance science and mathematics education K-16, the collaborative involved ten institutions serving the greater Los Angeles area, including five 4-year institutions and their 5 feeder two-year campuses. LACTE chose to address the preparation of preservice teachers seeking both secondary (single subject) credential and elementary (multiple subject) credentials. The project has made progress in many areas, including the following:

- Improving disciplinary courses—supporting revision or design of over 25 ongoing courses teachers take as undergraduates;
- Enhancing faculty—providing workshops for over 400 faculty members at the 10 LACTE institutions;
- Supporting and involving students—involving over 400 students every year in LACTE activities and events;
- Disseminating innovations—publicizing LACTE reforms, activities and innovative curricula through presentations, publications, and communication with newer Collaboratives around the country.
- Institutionalizing reforms—making permanent the LACTE course offerings and permanently strengthening support mechanisms on each campus for future teachers.

Introduction to The Documentation Case Study

This small documentation case study was focused solely on pre-service students involved in LACTE who are now teaching science and/or math K-16. The object of the study was to determine the perceived impact of LACTE activities on classroom teacher behavior and attitudes. It focused on the following two research questions:

- *To what extent do teachers credit LACTE experiences with contributing to their ability to teach math and science effectively?*
- *To what extent do teachers who have been involved in LACTE demonstrate in their classroom teaching content knowledge and pedagogical strategies consistent with exemplary, reform-based mathematics and science education?*

The study methodology consisted of a survey of 40 former LACTE students currently teaching in classrooms in the greater Los Angeles area, along with classroom observations of and interviews with 12 of these teachers (6 teaching math and 6 teaching science). Teachers were observed for one full class period, and observations were coded using a standardized protocol.

Although the researchers made every effort to ensure results that were reliable and valid, a number of factors affected the context in which the study was conducted, like the timing of the study immediately at the end of the LACTE project, the small survey size, the lack of true randomness, and the small scale of the observational study. Nonetheless, respondents to the survey generally reflect the population of current classroom teachers who have participated to some extent in the LACTE program.

The small number of middle school math teachers and high school science teachers among the respondents makes it difficult to interpret data simultaneously by grade level *and* subject taught for these two groups, i.e. middle school math teachers. Thus, most data was analyzed independently at the grade level *or* for subject taught (elementary teachers were considered as teaching both math and science).

Following are the major findings from the study, as well as the main conclusions drawn from it.

SURVEY FINDINGS

Demographics

- As predicted, respondents' involvement with LACTE came primarily from three institutions.
- Many survey respondents (slightly over 40%) are in their first two years of teaching.
- Slightly over three fourths of the teachers seem to have taken leadership roles in their schools.

Supportiveness of the School Environment

- Elementary and middle school teachers' find their school environments to be generally supportive of reform-based math/science teaching. High school teachers find their teaching environments less supportive.
- Teachers report those real barriers (time in the curriculum, limited funding, etc.), as well as a lack of a school-wide vision get in the way of such teaching.

Opinions about respondents' teacher preparation experiences

- Survey respondents rated the quality of their teacher preparation as generally adequate or exceptional, with preparation in science rated more positively than in math.

Reflections about teachers' connection with LACTE:

Involvement in LACTE

- As expected, participation by survey respondents in LACTE activities was uneven, but teachers who were involved in various LACTE activities believe that the program had a very positive impact on them and on their teaching.

Perceived impact of LACTE on math/science instruction

- Over 80% of responding teachers believe they use more standards-based, investigative methods to teach math and science because of their involvement in LACTE.
- Elementary and middle school teachers (but not high school teachers) also believe their involvement in LACTE helped them understand math and science content better.

Evidence for the actual use of reform-based pedagogy and philosophy in respondent's teaching

Teachers' current attitudes towards teaching math and science

- Teachers, especially elementary teachers, are more comfortable taking the role of facilitator rather than using a more structured, teacher-centered approach.
- Most teachers saw the need for balance between teaching content and encouraging 'sense-making' or thinking, among students.
- Science teachers especially felt that teaching content was more important than encouraging thinking.

Using reform-based math and science teaching practices

- Over half of the responding teachers of both math and science at all grade levels claim to use reform-based teaching strategies at least "regularly" or "all the time. More science teachers and middle school teachers, however, claim to use these strategies "all the time."
- Teachers responded similarly to a set of questions on reform-based student activities. Science teachers and middle school teachers employ them more frequently than do high school teachers or math teachers.

Use of technology

- Technology is most heavily used in science and at the middle school level.

FINDINGS FROM CLASSROOM OBSERVATIONS

Summary of classroom Observations

- Overall "capsule" observation ratings spanned the complete spectrum from 1 (ineffective instruction, pedantic and uninspiring) to 5 (exemplary instruction, purposeful, with all students highly engaged).
- Most classes were rated 2 or 3, and the average capsule score was 2.75.
- Although the number of observations was small, math classes received lower scores (average 2.17) than science classes (average 3.33), and high school classes got lower scores (average 1.7) than middle school (average 3.4) or elementary school classes (average 2.75).

Teaching experience

- No clear relationship emerged between years of teaching experience and classroom performance as reflected in the capsule ratings.

Extent of Involvement in LACTE

- Similarly, no obvious link could be determined between overall involvement in LACTE (categorized as minimal – only involved in one or two major LACTE activities, moderate – involved in 3-4 LACTE activities, or substantial – involved in more than 4 LACTE events) and the capsule ratings.
- No clear relationship emerged between grade level, LACTE involvement, and capsule ratings on observation protocols.
- Similarly, no relationship was revealed between where teachers received their preservice education and their overall capsule protocol scores.
- The only LACTE event that seems to correlate with the overall observation capsule rating is attendance at the LACTE Summer Science workshops.

Method of instruction

- In the high school classrooms, instruction was mostly delivered via lecture or problem modeling, while instruction in the elementary school classes usually involved hands-on activities, whole class discussion, or written or reading seat work.
- Small group instruction and hands-on activities occupied slightly over half of the class time in middle school classrooms, compared to only 10% of high school class time.
- Student engagement in classroom instruction was highest in elementary school and lowest in high school. It was also higher in science than in math.

Ratings of Key Indicators of reform-based pedagogy and of likely affect on student understanding

- Eleven questions in the protocol about lesson design and implementation and three on the likely affect of the lesson on student understanding provided additional ratings of how well the lesson reflected reform-based instruction. As in the surveys, the data revealed striking contrasts between middle and elementary classes and those in high school, as well as between science and math. High school instruction and math instruction were rated consistently lower than was instruction at the other levels and instruction in science.

Indirect Impacts of LACTE on Teachers and their Classrooms

- In the interviews, teachers expressed a number of benefits they received from the LACTE program, the most common of which were inquiry teaching strategies and a wealth of materials and resources. No clear relationship emerged, however, between the perceived benefits from LACTE and the capsule rating received by the teachers.

SUMMARY AND CONCLUSIONS

- The data reveal persistent differences among grade levels, with teaching at the middle and elementary schools being the most reflective of best practice in science and mathematics teaching, and high school instruction being the least.

- The data also reveal differences between subjects; with science teaching consistently more reflective of inquiry-based instruction than is teaching in mathematics.
- Although their involvement in the program was varied, teachers believe that LACTE contributed substantially to their preparation to teach both math and science.
- LACTE may also have had an indirect positive impact on teachers and their classrooms.
- Because over 3/4 of LACTE teachers claim to have assumed leadership roles in their schools, LACTE may have also had an indirect positive impact on the schools in which these teachers work.
- Finally, LACTE seems to have been the catalyst for some teachers in making the decision to enter the teaching profession, or to become math or science teachers.