

Prospective Experimental Program Concepts June 2010

Overview of this Report

The Commission adopted revised Experimental Program Standards at its March 2008 meeting, <http://www.ctc.ca.gov/commission/agendas/2008-03/2008-03-3A.pdf>. At the May 2008 COA meeting, staff presented information on the technical assistance meetings that were held focusing on Experimental Programs and procedures for programs to follow in proposing new Experimental Programs, <http://www.ctc.ca.gov/educator-prep/coa-agendas/2008-05/2008-05-item-17.pdf>. The procedures were detailed, including a possible timeline for the submission and approval process. This agenda item presents two concepts for experimental programs being considered by currently accredited institutions for the COA's discussion.

Staff Recommendation

This is an information item only.

Background

The purpose of experimental programs is described in the Experimental Programs Handbook:

The experimental program option is designed to encourage innovations in educator preparation and investigation of those innovations, with the aim of increasing the profession's understanding of professional learning and improving professional practice for the benefit of all students in California. Experimental programs were provided for in Education Code 44273(a) as a way for programs of "merit and the potential of improving the quality of service authorized by the credential" to be developed. In the past, few programs have been submitted under this option. The revised Experimental Program standards take into account this under-utilization and are designed to encourage innovation with accountability to the profession. (<http://www.ctc.ca.gov/educator-prep/standards/Experimental-Program.doc>)

The procedures the COA adopted to review and approve experimental programs are contained in the Experimental Programs Handbook. In the Spring of 2009, three institutions' concepts were presented to the COA. Two of those concepts were successfully expanded into proposals that were approved by the COA in May 2010. Attached to this agenda is the concept paper from Loyola Marymount University that describes the Math/Science Teacher Residency Program the institution proposes to develop as an experimental program.

After the COA's discussion of the experimental program concept, staff will utilize the committee's feedback to guide staff at the institution as they continue to develop their proposal. The full proposals will be reviewed by peer reviewers and when the reviewers find the proposal meets the Experimental Program standards, the prospective experimental program will be brought back to the COA for approval.

Appendix A

The Los Angeles Math/Science (LAMS) Teacher Residency Program: Experimental Standards Proposal

Edmundo F. Litton, Ed.D. (elitton@lmu.edu)

Katharine Clemmer, M.A.T. (kclemmer@lmu.edu)

Loyola Marymount University, Los Angeles, CA

Statement of the Problem

Math and science education has reached a crisis point in the United States. A majority of students in the United States are not achieving in math and science as well as their counterparts in other countries. There is also evidence that this underachievement is correlated with factors such as race, ethnicity, and socio-economic status. The National Report Card shows that only 32% of 8th grade students are at the level of “proficient” or higher in math and only 23% of 12th graders are “proficient” or higher in math. Even more disturbing, the California statistic from the 2009 Early Assessment Program shows that 21% of the entire student population is college ready with only 4% of African Americans and Hispanics college ready in mathematics. In science, the National Report Card shows that only 27% of 8th grade students are at the level of “proficient” and that California students are below the national average at 18%. At grade 12, the average science score was lower than in 1996, and showed no significant change from 2000. According to the 2009 ACT profile report, the percent of students meeting the ACT college readiness benchmark score in science is 33% for all students, 13% for Hispanics, and 10% for African Americans. For mathematics, 55% for all students, 31% for Hispanics, and 23% for African Americans.

According to the 2008 report of the National Mathematics Advisory Panel, the crisis in Math education not only influences the economic prosperity of the country but “it is yet more fundamental to recognize that the safety of the nation and the quality of life—not just the prosperity of the nation—are at issue”.

The National Mathematics Advisory Panel made various recommendations for the improvement of Math education (which are also applicable to science education). While some of the recommendations clearly point to reform in the curriculum, the panel recognized the significance of teacher training. The panel recommends that teacher training institutions:

1. Use value added assessments that clearly tie academic gains to effective teaching.
2. Develop a teacher’s math content knowledge since there is strong correlation between teachers’ content knowledge and student achievement. Teachers must have a more advanced perspective of the math content they are teaching.
3. Attract and prepare teacher candidates who have strong content knowledge in math [and science].

Purpose of the Research

Traditionally, teacher preparation programs in California focus on the development of

general pedagogical knowledge and skills. Candidates for the teaching profession demonstrate content knowledge as a pre-admission requirement by completing an approved subject matter preparation program or passing a subject matter examination (CSET), the assumption being that this satisfies the necessary mathematical or science content needed for effective teaching. In current programs mathematical or science knowledge may be touched upon in a methodology class but not in any depth.

The proposed program at Loyola Marymount University is a *teacher residency* program that focuses on three distinct domains: (a) the development of mathematical or science content knowledge, (b) the mathematical or science knowledge for teaching, and (c) general pedagogy. Loyola Marymount University is proposing to use the experimental program guidelines to seamlessly integrate the three domains so that candidates strengthen their teaching expertise in mathematics or science.

Research Questions

The program will be designed to provide answers to the following research questions:

1. How is resident competency in these three domains best assessed?
2. What are the best ways to integrate (a) the development of mathematical or science content knowledge, (b) the mathematical or science knowledge for teaching, and (c) general pedagogy?
3. What factors contribute to increased teaching and learning through positive collaboration between a pre-service teacher candidate (i.e. resident) and a master teacher (i.e. mentor)?
4. How is the role of the university faculty different in a teacher residency program?
5. Is the role enhanced in a teacher residency program?
6. How do diverse students in an urban middle or high school math or science class benefit from the collaboration between a resident, mentor, and university faculty?

Program Design

The **Los Angeles Math/Science Residency Program (LAMS)**, a collaborative K-12/IHE venture, prepares and guides qualified candidates along a path to be highly effective 6th -12th grade math or science teachers. It is based on proven teacher quality methodologies developed and tested in local schools by the Center for Math and Science Teaching (CMAST), located within Loyola Marymount University's School of Education (LMU/SOE). These methodologies are grounded in the research of Deborah Ball, John Bransford, Lee Schulman, Peter Senge, and James B. Rowley.

Individuals inducted as residents learn the teaching credential competencies during practice through a cognitive apprenticeship model where small cohorts of residents (approximately 10 in each cohort) learn to effectively teach mathematics or science in secondary schools through an integrated fieldwork and coursework construct. Residents apprentice with mentors who are teachers-of-record, meet rigorous criteria for selection, and participate in mathematics or science instructional leadership training. Coursework is delivered through an innovative method that capitalizes on the collaboration between residents, mentors, and university faculty. Mentors are teachers on staff at urban Los Angeles middle and high schools partnered with LMU.

The LAMS Residency values the following: (1) training and retaining highly effective mathematics and science teachers in high need, urban secondary schools, (2) placing students at the core of teaching and learning, (3) providing a rigorous apprenticeship experience for residents that blends theory and practice, (4) developing school cultures where collaboration, new teacher support, transparent practice, professional growth are valued, encouraged, and expected, and (5) applying and modeling mathematical and scientific thinking in all aspects of teaching, learning, and research.

Mentors and Residents learn through daily collaboration and problem-solving around innovative solutions connected to practice and grounded in research to move toward reversing the achievement gap. As a result secondary school students are engaged in increasing their academic proficiency in mathematics and science and show an interest in pursuing science, technology, engineering and mathematics (STEM) fields and careers.

Participants in this community internalize and execute the vision of the Residency Program, developing and expanding the base of teachers, administrators and other school leaders who strive to collectively increase teacher effectiveness and transform math and science education. A professional learning community (PLC)—including school administrators, university faculty, program directors, teachers and residents—provides the necessary support for math and science Residents and Mentors to teach, lead, and guide, thereby more effectively preparing tomorrow’s math and science professionals. Thus, the Residency program is transformative not only for the Resident, but also for the other members of the site faculty and administration, as well as university faculty.

The LAMS Residency is based on the research that has already been conducted on urban teacher residency programs. The LAMS Residency Program staff is participating in the training program offered by Urban Teacher Residency United (UTRU). The training received will refine the Residency before it is fully implemented in 2010. The LAMS Residency is built around the effective principles identified by UTRU:

- Weave education theory and classroom practice;
- Learning alongside an experienced and qualified Mentor;
- Work together as a Resident cohort;
- Build effective partnerships;

The program is designed for adult learners. The program design has been influenced in part by the adult learning theory principles outlined for teacher education programs by Northfield and Gunstone (1997), who state:

- Teacher education programs should model the teaching and learning approaches being advocated and promote the vision of the profession for which they are preparing teachers.
- Learning about teaching is a collaborative activity and teacher education is best conducted in small groups and networks with ideas and experiences being shared and discussed.
- Teacher education involves personal development, social development, as well as the professional development of teachers

Research shows that it is difficult to determine which teacher candidates will turn out to be highly effective through interviews or the other types of information typically available, such as alma mater and test scores. The LAMS Residency addresses this by providing a full year of *in situ* observations and collaboration for teacher candidates.

Effective math or science teachers are primarily defined by their ability to move students towards college readiness by the time they graduate from high school. Effective teachers can also be defined by common attitudes, beliefs and behaviors. Our goal is to increase the number of highly effective teachers in math and science. The program expects to use four categories of indicators to measure teacher effectiveness: Student academic gains; teacher practice observation data in mathematics or science; teacher, student, parent, and administrator feedback; and a measure of teacher attitudes and beliefs.

During the first semester of the one-year LAMS credential program, residents and mentors collaborate in developing the classroom learning culture. The residents co-plan, co-teach, reflect, and de-brief around targeted components within lessons and units daily, culminating in a lead teaching week in January where the resident teaches the entire week. Based on data from the lead teaching week, residents will be released to teach either parts of lessons or units daily, culminating in lead teaching of a unit of study. During this cycle of learning coursework is integrated throughout the building classroom culture, co-planning, co-teaching, reflection and de-brief components. The one-year LAMS Residency program will culminate with the residents earning a preliminary California secondary teaching credential in mathematics, biology, chemistry, or physics. The model involves co-planning, co-teaching, co-learning, within the context gradual release of responsibilities.

The primary benefit of the one-year Residency Program is its ability to align training of incoming math and science teachers with the definition of teacher effectiveness. The unique elements of its design include:

- Fosters mathematics and science professional learning communities through collaboration among university faculty, residents, and mentors to deliver coursework that integrates theory and practice.
- Aligns to the California Standards for the Teaching Profession (CSTPs) and introduces the innovation of residents learning in the field as apprentices to experienced, trained master teachers (mentors) in collaboration with university faculty.
- Embeds a Student Achievement Value-Added System into the evaluation design used to monitor student and teacher achievement of the teaching and learning competencies that define high quality math and science teaching, and provide project staff with real-time data to examine how teacher characteristics impact student achievement.
- Connects empirically-based practice and scientifically-valid research in

mathematics and science teaching and learning to the assertive collaboration and critical reflection among Residents, Mentors, and faculty for the purpose of increasing student engagement and proficiency in mathematics and science to ensure all students will become more mathematically and scientifically literate.

- Prepares residents to become effective scholar practitioners and collaborators with university math, science, and education faculty, who are skilled in gathering information from literature about the fields; developing a research plan that can be effectively implemented with measurable student outcomes; and presenting conclusions that positively inform best teaching and learning practices to increase mathematical and scientific literacy.
- Establishes a frame where differentiated instruction to meet the needs of all students is the norm and not an addition to instructional practices.

These elements are implemented through the following resident learning experiences:

- **Daily Active Observations** that provide residents the time and tools to document student evidence that demonstrates effective mathematics or science teaching and learning by mentor around a targeted resident learning competency (i.e. organizes physical space to maximize learning, effectively manages student behavior, etc.), and **De-Brief Sessions** that provide an opportunity for residents to analyze their targeted observations and reflections on classroom practice with their mentors who provide the theoretical construct.
- **Cohort Learning Seminars** (three times a month) that bring residents, mentors, and university faculty together to strengthen residents' learning competencies by explicitly connecting practice and theory through reflection, analysis, and problem solving. Once a month this professional learning community will participate in **Instructional Rounds** (once a month) (City, E. & Elmore, R., Fiarman, S., Teitel, L., 2009).
- **Professional Learning Community** (PLC) Dialogues (once a month) that includes residents, mentors, university faculty, school administrators, math and science expert practitioners throughout the Los Angeles area, and Project Coordinators. Residents will learn to become scholar researchers through participating in action research discussions with their future colleagues.
- A **Virtual Resident Community** that provides residents with instant access to curriculum, resources, current best practices, and real-time problem solving that support implementing effective mathematics or science teaching.

Through LAMS, residents will learn the competencies to maximize mathematical or science development for all students including English Learners, students with disabilities, students gifted and talented and students at-risk. The program develops candidates' specialized mathematical or science knowledge for teaching and integrates mathematical or science content knowledge and pedagogical knowledge. The program teaches candidates to use and integrate these three domains

of knowledge in their developing practice. Integrated coursework and fieldwork provide candidates with an environment conducive to intellectual risk-taking and multiple ways of approaching mathematical or science and pedagogical problems, thereby providing a model for candidates to enact in their own practice. The program teaches candidates to apply the *Teaching Performance Expectations* (TPEs) to the teaching of mathematics or science by implementing curriculum frameworks, state-adopted academic content standards for students, and adopted curriculum materials.

Overall the program design ensures that candidates are able to create a mathematical or science instructional program that meets the diverse needs of California's student population. The program prepares candidates to teach mathematics or science using the balanced approach, including computational and procedural skills, conceptual understanding, problem solving, and inductive/deductive thinking outlined in the *California Mathematics Framework* (e.g., 2005, p. xiv). The program provides opportunities for candidates to develop and implement teaching and learning strategies designed to enable all students to become mathematically or scientifically proficient in the intertwined strands of adaptive reasoning, strategic competence, conceptual understanding, productive disposition, and procedural fluency (National Research Council, 2001, p. 5 & U.S. Department of Education, 2008).