

Louisiana Math and Science Teacher Institute

Project Overview

The Louisiana Math and Science Teacher Institute (LaMSTI) offers a special track of the LSU Masters of Natural Sciences Degree program designed for practicing middle- and high-school math or science teachers. The academic work is delivered in three intensive, six-week summer institutes and the two intervening academic years. All academic work is scheduled to avoid conflicts with teaching.

Candidates join cohorts and form deep, meaningful, lasting professional associations with their peers and with university faculty. They receive a tuition waiver and a \$20,000 stipend (\$1000/week in summer for 3 six-week terms, and \$1000 in each academic year).

The program serves fifteen school districts which lie within 45 miles of Louisiana State University (LSU), serving about a fifth of the students in the state. These districts include about 100 schools in the 7-12 grade band and about 60,000 students at this level.

Admission is competitive. Opportunities and support offered by the districts figure significantly in the selection process. The academic program is receptive to inputs from districts and aims to support them in bringing about the positive changes they desire.

Core Partners

Louisiana State University. The LSU Gordon A. Cain Center for STEM Literacy fosters collaboration among LSU science, mathematics, engineering and education faculty to make gains in K-20 STEM education. In collaboration with the College of Education and the nearby school systems, the Center coordinates LSU's highly-regarded undergraduate STEM teacher preparation program, GeauxTeach, which enables undergraduates to pursue degrees in science or math while earning a Secondary Teaching Certification. The Center is the lead partner in numerous federal and state grants for outreach in STEM education.

The East Baton Rouge Parish School System. With about 45,000 students (76% on free or reduced lunch, 80% African-American), the East Baton Rouge Parish School System is the largest in the state. Many of the 75 schools in the district are seriously underperforming according to state assessments, yet the district also contains 3 of the 25 public schools in the state with the

highest performance scores. The district is expanding teacher-coaching systems as a means of improving instructional effectiveness. It has formulated its commitment to the Louisiana Math and Science Teacher Institute so that it may act in incremental steps. Under one scenario envisioned by Dr. Herman Brister, Chief Academic Officer at the EBRPES and Co-PI for this project, there will eventually be one math and one science coach per middle/secondary school.

The Iberville Parish School System. Headquartered in the town of Plaquemine across the Mississippi River from Baton Rouge, the Iberville School System one-tenth the size of EBRPSS. It serves a rural community, but the racial and economic profile of its student body is very similar to EBRPSS. Until a few years ago, the district was one of the lowest performing in the state. A tax increase, supported by local industries and approved by voters in March 2008, enabled the district to increase teacher salaries to tie for first place in the state, and also made possible capital investments. Superintendent Ed Cancienne, co-PI of the Louisiana Math and Science Teacher Institute, has helped to guide the transformation of the district.

Goals of the Institute

Learning Community. LSU, Baton Rouge-area school districts and the Louisiana Department of Education will create a well-integrated, effective professional learning community focused on the natural sciences, with the newly established math/science-teacher track of the Master of Natural Sciences (MNS) professional degree program at LSU serving as a face-to-face network hub.

Opportunity and Diversity. The LSU MNS will accelerate the creation of new career tracks and opportunities for middle and high school math and science teachers in and around Baton Rouge. It will attract large numbers of teachers from communities of color. Graduates of the program will work on district, state and university initiatives to enhance K-20 STEM education, adding to the racial/ethnic diversity of the field.

Academic integrity. The MNS degree program will solicit input from mathematicians and scientists, practicing science teachers, and state consultants to develop and deliver a course of study that is research-based, focused on important mathematical and scientific ideas and effective in helping teachers meet the needs of their students and achieve the State's curricular goals.

Rigorous Evaluation. Student achievement in math and science in the middle and high schools in the Baton Rouge area will improve as a demonstrable result of inputs from MNS graduates. The statewide data collection system will be used to track student progress and teacher effectiveness; custom-made data collection systems will track teacher activities to support causal conclusions.

Sustainability. The MNS program will result in enhanced, adaptable, sustainable partnership opportunities, courses and curricula, as demonstrated by numerous indicators.

Fundamental Research. A team of researchers from the LSU Department of Psychology will deepen our understanding of the teacher networks and expertise.

How will we demonstrate success?

Associated with each main goal are measurable outcomes (as well as annual and cumulative benchmarks, not shown).

Learning Community

- 96 practicing teachers will enter the T-MNS degree program at LSU, with at least a 92% completion rate per cohort.
- The number of teachers indicating engagement in a leadership role will increase by 25% or higher per cohort.

Opportunity and diversity

- The T-MNS will increase the number and percentage of participants from diverse backgrounds and under-represented populations for each cohort until these percentages are comparable to the composition of the state.
- The number of T-MNS participants who connect with and/or participate in leadership and/or support roles in other education initiatives, including T-MNS (as an aide or co-instructor) will increase on an annual basis and represent 5% of total participants.

Academic integrity

- T-MNS curriculum aligns with various curriculum standards (College Board AP math and science, entry-level university math and science, etc.) and the research base in the field.
- Participating teachers will increase their content knowledge, as well as levels of preparedness and confidence in teaching mathematics and/or science, based on statistically significant changes pre- to post-administration on the teacher survey

and content knowledge inventory over the duration of the courses.

Evaluation

- Percent of students of participating teachers performing at the mastery or higher level in mathematics and/or science will increase by 5% on an annual basis.
- Statistically significant increase based on pre- post comparison of teacher indicators of satisfaction, levels of preparedness, and confidence related to teaching.

Sustainability.

- The number of partnership activities between LSU colleges and divisions and/or partner schools increase on an annual basis.
- At least one T-MNS course is made available on an annual basis for use by other institutions.
- On an annual basis, T-MNS will demonstrate meeting at least three of 9 indicators of sustainability. These indicators include strong leadership; strong infrastructure and organizational development; support structures; credibility; incentives; visibility; strong, mutually beneficial partnerships; and macro-culture development.

Fundamental Research.

- The research team will publish at least one significant research paper annually and will obtain independent funding.

LSU Masters of Natural Sciences Professional Degree Program for STEM Teachers

In Summer 2007, LSU began offering teachers access to a special track of the Master's of Natural Sciences (MNS), a professional degree offered by the College of Basic Sciences. This program has a schedule that is accessible to teachers and a curriculum optimized to meet their needs. It offers degrees in mathematics, physical science, and biological sciences, with a focus on depth and rigor in content while emphasizing direct connections to 7-12 classrooms. STEM faculty with extensive experience in teacher education are designing and developing a custom-made curriculum that references the state standards, links ideas from middle school to college and uses a mixture of pedagogical approaches.

The immediate impetus for launching the prototype for the Louisiana Math and Science Teacher Institute in 2007 arose within a collaborative between the EBRPSS

and the Cain Center that aimed to turn around Glen Oaks Middle School, a failing inner-city school. This included a plan to attract quality math and science teachers to that school and increase the number of highly qualified teachers in the district. The prototype expanded in the following year with seed funding from the Louisiana Board of Regents. Seven teachers completed their degrees in 2009 and 20 teachers are presently progressing toward graduation in 2010 or 2011.

Network of Associations

Fifteen school districts lie within 45 miles of Louisiana State University (LSU). Varying markedly in setting (rural/urban), size, composition and performance, they serve nearly a fifth of the students in the state. Initiatives such as the Louisiana/USDoE MSP, LaSIP (the Louisiana Systemic Initiative), LATAAP (the Louisiana Teacher Assistance and Assessment Program), the Math Fellows Program (an advisory panel recently established by the State Superintendent) and various professional organizations create a network of personal and professional relations and associations. The Louisiana Math and Science Teacher Institute will become a hub in this network, acting as a clearinghouse for ideas, models and practices, supplying a rigorous, research-based ideas for improving instruction and most importantly fostering a face-to-face network of teacher-leaders.

Challenges

The Institute must serve teachers of vastly different backgrounds and areas of experience. It must cooperate effectively with large urban inner-city districts, middle-class suburban districts as well as with isolated, high-poverty rural communities, and it must coordinate contributions from several colleges and six or more academic departments to provide learning experiences for teachers that bridge K-12 and university culture and that pan out in improved student learning. Our most powerful resource in meeting these challenges has been the ingenuity, dedication and wisdom of our teacher participants.

What we hope to learn from other projects

- What is the best way to balance open-ended, exploratory work with study and course work that is directly focused the specific learning standards that that are enforced by districts by the state?

- What is the evidence for the value of research-like learning experiences for teachers? How are other projects responding to proposed national standards? How are they assisting districts that want to increase success in Advanced Placement?
- What are effective models for training in instructional leadership?
 - What are "value-added" statistical models telling us about the training offered by other MSP projects?

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Project Directors/Principal Investigators

- Herman Brister, Interim Chief Academic Officer, East Baton Rouge Parish Schools
- Gary Byerly, Associate Dean of Basic Sciences, LSU
- Ed Cancienne, Superintendent, Iberville Parish Schools
- James J. Madden, Professor of Mathematics, LSU

For more information, contact:

James J. Madden
Professor of Mathematics
222 Prescott Hall
Louisiana State University
Baton Rouge LA 70803-4918
Email: madden@math.lsu.edu
Telephone: (225) 578-7988
Cell Phone: (225) 978-3525

or

Leslie Blanchard
Operations Manager
LaMSTI
245 Hatcher Hall
Louisiana State University
Baton Rouge, LA 70803
Email: LellB@lsu.edu