Adding rigor to support your existing curricula and enhance and grow your AP program

Laying the Foundation (LTF) is a well established, comprehensive program which seeks to improve student achievement in mathematics, the sciences and English Language Arts. LTF is dedicated to providing quality teacher-to-teacher training, rigorous classroom materials, and web-based resources to improve the quality of instruction. The program provides mathematics, science and English teachers grades 6-12 with content knowledge, teaching strategies, and vertically aligned materials that combine to impact student achievement. Additionally, the emphasis on technology in math and science classrooms provides more relevant and engaging coursework for students preparing to enter STEM-related fields.

There are 12 consecutive modules of training in each content area offered over the course of 3 years. Each module incorporates differentiated instruction ideas and formative assessments. Participating teachers have found the materials to be particularly helpful in developing common formative assessments and filling the gaps in their curricula. All modules are aligned with Connecticut state standards.
Laying the Foundation

Mathematics

LTF training for Pre-AP math utilizes resources and strategies to employ the five elements of math learning:

1. Graphical: understand and interpret data, communicate data via visual representations, conceptual geometry comprehension
2. Physical: utilize manipulatives and models, data collection for experiments, “real world” applications
3. Verbal: interpret, explain, justify, and summarize data
4. Analytical: understand and utilize functions, variables, definitions, theorems, and symbols
5. Numerical: perform calculations, approximations, and data analysis

Through the modeling of lessons, teachers learn to integrate rigorous critical strands from AP Calculus and Statistics in every grade from sixth grade through high school, thus allowing students to build on concepts introduced early in middle school and reinforced every year in order to fully master concepts at the AP and college level. Strategies for integrating graphing calculators and manipulatives into classroom lessons represent a particularly significant component of LTF math training. Teachers also learn through demonstration the value of hands-on student involvement and ways in which it enriches existing curricula and increases levels of student engagement.

Participants explore the AP* Calculus or AP Statistics Connection topics through manipulative-rich student lessons. Graphing calculator skills are introduced, extended, and applied as a part of each training session. In addition, the participants explore the LTF on-line diagnostics with both multiple choice and free response problems and discuss scoring practices and rubrics of Pre-AP* questions related to the AP connection topic.

Teachers finish every training day with lessons that are classroom-ready and with sufficient preparation to start using the lessons and assessment tools immediately.

Module 1: Analysis of Piecewise Functions
A combined group of middle school and high school teachers attend a common session using an analysis of functions to investigate student lessons that demonstrate how upper level concepts are developed from sixth grade through pre-calculus. Participants are given password access to on-line versions of LTF guide lessons, diagnostics tests, and end-of-course examinations.

Module 2: Areas and Volumes
Middle school and high school teachers attend separate sessions where they will explore manipulative-rich student lessons that investigate the area of two-dimensional figures, as well as surface area and volume of three-dimensional solids that result from revolving the planar figures about an axis. As the lessons progress through this vertical strand, teachers learn how students graph the original planar figure by first plotting points, then graphing equations, and finally graphing systems of inequalities. This session demonstrate how concepts involving area and volume are developed from sixth grade through pre-calculus.

Module 3: Rate of Change: Average and Instantaneous
Teachers explore lessons that differentiate between the average and the instantaneous rate of change of a function. Middle school teachers explore manipulative-rich lessons that introduce the concepts of constant rate of change and average rate of change. High school teachers are introduced to the concept of a curve with a varying slope and to the calculus notation for a derivative to represent that slope. The session further emphasizes how the concepts involving rate of change are developed from sixth grade through pre-calculus.

Module 4: Graphical Displays; Distributions: Measures of Center, Variability, and Shape
Teachers explore the concept of graphical displays by working student lessons that construct, compare, analyze, and interpret box-and-whisker plots, line plots (dot plots), and stem-and-leaf plots. Each lesson employs real-world data to construct, by hand and with a graphing calculator, appropriate graphical displays and to analyze the graph using measures of central tendency, variability, and shape. The session emphasizes how the concepts involving graphical displays and distributions can be used from sixth grade through pre-calculus.

Module 5: Accumulation
Participants explore the concept of accumulating area that leads to the concept of the definite integral in AP Calculus. Teachers explore techniques for approximating area of various closed regions through manipulative-rich middle school lessons. High school lessons extend these techniques to determining the area under a curve using geometric figures. In addition, non-area applications involving rates of change are investigated. The session emphasizes how the concepts involving accumulation are developed from sixth grade through pre-calculus.

Module 6: Probability
Participants delve into student lessons that investigate probability. Techniques include using a sample space, conducting simulations, and collecting data. Teachers discover and apply Pascal’s Triangle and the Binomial Theorem to probability. Additional topics include geometric probability and permutations and combinations. The session emphasizes how the concepts involving probability and statistics are developed from sixth grade through pre-calculus.
Module 7: Position/Velocity/Acceleration
Participants explore the concepts and relationships of position, velocity, and acceleration. They use physical activities and technology such as a CBR and a graphing calculator to more fully understand the concepts. Lessons include sketching a graph from a story, interpreting graphs from a verbal description, and analyzing and comparing graphs of position, velocity, and acceleration. The session emphasizes how the concepts involving position, velocity, and acceleration are developed from sixth grade through pre-calculus.

Module 8: Limits
Participants explore the concept of limits from various perspectives. Student lessons use pattern recognition, perimeter and area of polygons, secant and tangent lines to circles and ellipses, and end-behavior of rational functions to lead to an informal notion of a limit. The session emphasizes how the concepts involving limits are from sixth grade through pre-calculus.

The training and resources place a heavy emphasis on hands-on learning through laboratory activities and the use of technology in the classroom. Teachers learn through demonstrations and modeling that integrate critical strands from Chemistry, Biology and Physics. Users of the program have learned that by engaging students in a hands-on, interactive learning environment, their students were more likely to take advanced science courses later in high school and opened up opportunities to explore scientific careers.

The LTF activities also “put the math back into science.” The graphing, data interpretation/analysis, and mathematical problem solving encouraged by LTF science trainers provide important links from early grade science classes to math-based expectations in AP-level courses in grades 11 and 12. Through training, teachers gain a more thorough understanding of the finding that, according to the Third International Mathematics and Science Study (National Science Foundation in conjunction with National Center for Education Statistics), students who take rigorous mathematics and science courses are more likely to go on to college than those who do not.

The training is consecutive over three years, 4 modules offered each year. There are core modules for Middle Grades, Life and Earth and Middle Grades Physics and Chemistry. High School teachers select from Chemistry, Physics, and Biology. Each day entails some direct content instruction as well as active learning through laboratory explorations. Participants examine the processes of learning science and engage in meaningful discussions of rigor and pace of the curriculum. Participants are given passwords to access the protected materials on the LTF website, including diagnostic activities and End-of-Course test materials. Teachers leave every training day with lessons that are classroom-ready and with sufficient preparation to begin using the lessons in their own classrooms.

Module one is the same for all 5 areas. It is presented to a combined audience of middle and high school teachers.

Middle School Life and Earth and Physics and Chemistry
1: Experimental Design
2: Numbers in Science
3: Meaningful Graphs
4: Rate
5: Patterns
6: Properties of Matter and Density
7: Evolution and Energy
8: Environmental Human Impact

Physics
1: Experimental Design
2: What is Pre-AP Physics and Kinematics I?
3: Developing Skills and Mechanical Waves
4: Using the Tools – Electricity and Magnetism I
5: Kinematics-2 Dimensional Motion-Impulse and Momentum
6: Dynamics-work, Power and Energy
7: Waves and Sound-Light and Optics
8: Electricity, Magnetism, and Modern Topics

Chemistry
1: Experimental Design
2: Graphing Calculators and Data Collection Devices
3: Atomic Structure
4: Bonding and Nomenclature
5: Mathematics and the Periodic Table
6: Intermolecular Forces and Condensed States of Matter
7: Thermodynamics
8: Assessment and Kinetics

Biology
1: Experimental Design
2: Chemistry of Life and Cells I
3: DNA, Genetics and Animals I
4: Plants, Ecology and Evolution I
5: Measurement and Statistics
6: Chemistry of Life and Cells II
7: Cellular Processes and Animal Adaptations
8: Plants and Ecology

SCIENCE

Participants explore the skills, concepts, and teaching strategies included in the grade specific LTF Resource and Planning guides for English. The guides were developed to help teachers build rigor into the Language Arts curriculum starting in the middle school to prepare students for success in Advanced Placement Language and Literature courses.

Each guide includes lessons that are classroom-ready as well as lessons that serve as models from which teachers can develop their own lessons. Participants are given passwords to access the protected materials on the LTF website, including diagnostic activities and End-of-Course test materials. Teachers leave every training day with lessons that are classroom-ready and with sufficient preparation to begin using the lessons in their own classrooms. All modules include a lesson written in English and in Spanish for use with English language learners.

Year one modules: Introduction to Laying the Foundation, Annotation and Analysis of Text, Exploring Syntax, and From Journal to Essay. The strategies and activities focus on analyzing and annotating texts, understanding levels of thinking, and determin-
ing the distinction between grammar and syntax. Teachers work through the entire process of creating an essay to teaching students how to develop and organize an essay to scoring with rubrics.

Year two provides an in-depth look at some of the skills, concepts and teaching strategies introduced in the first year of training and integrates close reading, grammar and composition activities in a study of style analysis.

Year two modules: Connecting Devices to Meaning, Linking Characterization to Meaning, Determining Tone and Determining the Underlying Meaning. Participants review methods of teaching students to find examples of literary devices in a text, link those devices to meaning and compose an essay that includes textual evidence and analytical commentary (including a lesson on Analyzing a visual Text).

Participants also focus on indirect and indirect characterization, analysis of poetry with a particular emphasis on determining tone through recognizing devices that contribute to tone, and strategies that enable students to recognize and state the theme of a literary work and support their theme statement with relevant textual evidence. Using challenging and grade level appropriate passages from prose and poetry, participants review strategies for teaching students how concrete elements such as diction, imagery, figurative language and syntax help to reveal an abstract concept like theme in a work of literature.

Year three explores a variety of argumentative texts, including essays, speeches, advertisements, and visual texts, and explores strategies for teaching rhetorical analysis through the integration of close reading, grammar, and composition activities. Year three modules: Understanding the Appeals, Analyzing Organization and Syntax, Writing Analysis and Persuasion, and Evaluating and Revising. These training modules emphasize recognition and use of the rhetorical appeals, persuasive techniques, and organizational structures. Training includes lessons for teaching students to develop their own persuasive writing and revising skills. Participants examine diagnostic activities and End-of- Course test materials from the LTF website, review the tenets of holistic scoring, and evaluate a set of student responses to a rhetorical analysis free response question.

WORKSHOPS

MATH
- June 21-24, Year 2, Middle and High School Sessions
  8:30 a.m. – 3:30 p.m.
  Windsor High School
- June 28-July 1, Year 1
  Middle and High School Sessions
  8:30 a.m. – 3:30 p.m.
  Windham High School
- August 2-5, Year 1
  High School Session
  8:30 a.m. – 3:30 p.m., CREC, Hartford
- August 16-19, Year 2
  Middle and High School Sessions
  8:30 a.m. – 3:30 p.m.,
  Wilbur Cross High School, New Haven
- August 23-26 (other two days TBD),
  Year 1, Middle and High School Sessions, 8:30 a.m. – 3:30 p.m.,
  Site TBD

SCIENCE
- August 16-19, Year 1
  Middle and High School Sessions
  8:30 a.m. – 3:30 p.m.
  East Hartford High School
- September 30, October 1, January 13-14, Year 2
  Middle School Sessions
  8:30 a.m. – 3:30 p.m.
  Site TBD

ENGLISH
- June 21-24, Year 2
  8:30 a.m. – 3:30 p.m.
  Windsor High School
- June 28-July 1, Year 1
  Middle and High School Sessions
  8:30 a.m. – 3:30 p.m.
  Career High School, New Haven
- August 16-19, Year 2
  Wilbur Cross High School
  New Haven
- August 23-24, (other two days TBD),
  Year 1, New Britain High School

REGISTRATION

Sessions are limited to 30 participants.
Additional workshops will be scheduled for all content areas during the 2010-2011 school year. A minimum of 15 participants are required for the training to be held.

Questions? Contact Helen Weingart, 860-455-1571, hweingart@eastconn.org.

Register at www.registereastconn.org.

Fee: None for Project Opening Doors schools;
     $450 for Non-Participating schools, includes resource book