



Curriculum Units by Fellows of the Yale-New Haven Teachers Institute  
2012 Volume IV: Engineering in the K-12 Classroom: Math and Science Education for the 21st-Century Workforce

---

## Preface

In March 2012, forty-six teachers from seventeen New Haven Public Schools became Fellows of the Yale-New Haven Teachers Institute® to deepen their knowledge of their subjects and to develop new curricular materials for school courses. Established in 1978, the Institute is a partnership of Yale University and the New Haven Public Schools, designed to strengthen teaching and improve learning of the humanities and the sciences in our community's schools. Through the Institute, Yale faculty members and school teachers join in a collegial relationship. The Institute is also an interschool and interdisciplinary forum for teachers to work together on new curricula.

The Institute has repeatedly received recognition as a pioneering model of university-school collaboration that integrates curriculum development with intellectual renewal for teachers. Between 1998 and 2003 it conducted a National Demonstration Project to show that the approach the Institute had taken for twenty years in New Haven could be tailored to establish similar university-school partnerships under different circumstances in other cities. An evaluation of the Project concluded that new Institutes following the Institute approach could be rapidly established.

Based on the success of that Project, in 2004 the Institute announced the Yale National Initiative to strengthen teaching in public schools®, a long-term endeavor to influence public policy on teacher professional development, in part by establishing exemplary Teachers Institutes in states throughout the country. In 2009 *An Evaluation of Teachers Institute Experiences* concluded that such Institutes promote precisely the teacher qualities known to improve student achievement and epitomize the crucial characteristics of high-quality teacher professional development. The study found that Institute participation was strongly correlated with teacher retention. In New Haven, Institute participants were almost twice as likely as non-participants to remain in teaching in a New Haven public school.

Teachers had primary responsibility for identifying the subjects on which the Institute would offer seminars in 2012. Between October and December 2011, Institute Representatives canvassed teachers in each New Haven public school to determine the subjects they wanted the Institute to address. The Institute then circulated descriptions of seminars that encompassed teachers' interests. In applying to the Institute, teachers described unit topics on which they proposed to work and the relationship of those topics both to Institute seminars and to courses they teach. Their principals verified that their unit topics were consistent with district academic standards and significant for school curricula and plans, and that they would be assigned courses in which to teach their units in the following school year. Through this process four seminars were organized, corresponding to the principal themes of the Fellows' proposals. Between March and July, Fellows participated

in seminar meetings, researched their topics, and attended a series of talks by Yale faculty members. The four seminars were on "Understanding History and Society through Visual Art, 1776-1914," led by Timothy J. Barringer, Paul Mellon Professor of the History of Art; "The Art of Biography," led by John Lewis Gaddis, Robert A. Lovett Professor of History; "Anatomy, Health, and Disease: From the Skeletal System to Cardiovascular Fitness," led by William B. Stewart, Associate Professor of Anatomy; and "Engineering in the K-12 Classroom: Math and Science Education for the 21st-Century Workforce," led by Paul R. Van Tassel, Professor of Chemical and Environmental Engineering.

The curriculum units Fellows wrote are their own; they are presented in four volumes, one for each seminar. A list of the 204 volumes of Institute units published between 1978 and 2012 appears after the units. The units contain five elements: content objectives, teaching strategies, sample lessons and classroom activities, lists of resources for teachers and students, and an appendix on the academic standards the unit implements. They are intended primarily for the use of Institute Fellows and their colleagues who teach in New Haven. They are disseminated on Web sites at [yale.edu/ynhti](http://yale.edu/ynhti) and [teachers.yale.edu](http://teachers.yale.edu). Teachers who use the units are encouraged to submit comments at [teachers.yale.edu](http://teachers.yale.edu).

The *Guide* to the 2012 units contains introductions by the Yale faculty members who led the seminars, together with synopses written by the authors of the individual units. The Fellows indicate the courses and grade levels for which they developed their units; many of the units also will be useful at other places in the school curriculum. Copies of the units are deposited in all New Haven school libraries. Guides to the units written each year, a topical *Index* of all 1856 units written between 1978 and 2012, and reference lists showing the relationship of many units to school curricula and academic standards are online at [yale.edu/ynhti](http://yale.edu/ynhti).

The Yale-New Haven Teachers Institute is a permanently endowed academic unit of Yale University. The New Haven Public Schools, Yale's partner in the Institute, has supported the program annually since its inception. The materials presented here do not necessarily reflect the views of the funding agencies.

James R. Vivian

New Haven

August 2012

---

<https://teachersinstitute.yale.edu>

©2019 by the Yale-New Haven Teachers Institute, Yale University

For terms of use visit <https://teachersinstitute.yale.edu/terms>