Yale National Initiative
to strengthen teaching in public schools®

Curriculum Units by Fellows of the National Initiative
2017 Volume V: From Arithmetic to Algebra: Variables, Word Problems, Fractions and the Rules

Preface

In March 2017 the Yale National Initiative to strengthen teaching in public schools® accepted public school teachers from twenty school districts in eight states and the District of Columbia to participate in six national seminars held at Yale University. The Initiative is a long-term endeavor to influence public policy on teacher professional development, in part by establishing exemplary Teachers Institutes for high-need schools in states around the country.

Teachers Institutes are educational partnerships between universities and school districts designed to strengthen teaching and learning in a community's high-poverty, high-minority public schools. Evaluations have shown that the Institute approach exemplifies the characteristics of high-quality teacher professional development, enhances teacher quality in the ways known to improve student achievement, and encourages participants to remain in teaching in their schools.

Fifty-three of the teachers, named Yale National Fellows, were from school districts that are planning or exploring the establishment of a new Teachers Institute for the Bay Area, CA; Chicago, IL; the Diné Nation, AZ and NM; the District of Columbia; Pittsburgh, PA; Richmond, VA; San José, CA; and Tulsa, OK. Other National Fellows came from existing Teachers Institutes located in New Castle County, DE; New Haven, CT; and Philadelphia, PA. Overall, more than half of the National Fellows were participating in national seminars for the first time.

The National Fellows attended an Organizational Session of the seminars held in New Haven on May 5-6. The seminars reconvened during a ten-day Intensive Session from July 10-21 and concluded in mid-August when the Fellows submitted their completed curriculum units. The six seminars were:

- "The Illustrated Page: Medieval Manuscripts to New Media," led by Jessica Brantley, Professor of English;
- "Chemistry of Cooking," led by Gary W. Brudvig, Professor of Chemistry and of Molecular Biophysics and Biochemistry;
- "Literature, Life-Writing, and Identity," led by Jill Campbell, Professor of English;
- "Poetry and Public Life," led by Paul H. Fry, Professor of English;
- "From Arithmetic to Algebra: Variables, Word Problems, Fractions and the Rules," led by Roger E. Howe, Professor Emeritus of Mathematics; and
- "Engineering of Global Health," led by W. Mark Saltzman, Professor of Chemical and Biomedical Engineering.

The purposes of the program are to provide public school teachers deeper knowledge of the subjects they teach and first-hand experience with the Teachers Institute approach. This heightens their leadership in an

existing Teachers Institute or prepares them to lead the development of a new Teachers Institute. Each teacher writes a curriculum unit to teach his or her students about the seminar subject and to share with other teachers in their school district and, over the Internet, with teachers anywhere. The curriculum units contain five elements: content objectives, teaching strategies, examples of classroom activities, lists of resources for teachers and students, and an appendix on the district academic standards the unit implements. In these ways the curriculum units assist teachers in engaging and educating the students in their school courses.

The curriculum units National Fellows wrote are their own; they are presented in six volumes, one for each seminar.

The Yale-New Haven Teachers Institute® is a permanently endowed academic unit of Yale University, which undertook the National Initiative in 2004.

James R. Vivian

New Haven

August 2017