

Annenberg/CPB

Professional Development Workshop Guide

Insights Into Algebra 1: Teaching for Learning

An eight-part professional development workshop
for Algebra 1 teachers

Produced by Thirteen/WNET New York

Insights Into Algebra 1: Teaching for Learning

is produced by
Thirteen/WNET New York

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Table of Contents

Introduction	1
About the Workshop	1
Workshop Components	3
Helpful Hints for Facilitators	4
About the Contributors	5
Workshop 1. Variables and Patterns of Change	9
Workshop 2. Linear Functions and Inequalities	17
Workshop 3. Systems of Equations and Inequalities	25
Workshop 4. Quadratic Functions	33
Workshop 5. Properties	39
Workshop 6. Exponential Functions	47
Workshop 7. Direct and Inverse Variation	55
Workshop 8. Mathematical Modeling	61
Appendix	71
Lesson Materials	72
Credits	83

About the Workshop

Overview

Welcome to *Insights Into Algebra 1: Teaching for Learning*, an eight-part video, print, and Web-based professional development workshop for in-service teachers. Participants will explore strategies to improve the way they teach 16 topics found in most Algebra 1 programs. In each session, participants will view two half-hour videos and engage in activities designed to help them examine their teaching practice, incorporate what they are learning into their practice, share their experiences with other teachers, and reflect on their ongoing development.

Workshop Descriptions

The video lessons address the following algebra topics. Participants can visit the workshop Web site for a deeper exploration of the teaching strategies listed for each session.

Workshop 1: Variables and Patterns of Change

- Part I: Translating words into symbols by forming algebraic equations from written sentences, and translating symbols into words.
- Part II: Solving linear equations using manipulatives and algebra.

Teaching Strategies:

- Manipulatives
- Cooperative learning

Workshop 2: Linear Functions and Inequalities

- Part I: Finding equations of linear functions when given either a graph or information about the line or a contextual situation, and modeling with linear functions.
- Part II: Solving linear equations and inequalities using algebra, graphs, and tables.

Teaching Strategies:

- Technology
- Worthwhile mathematical tasks

Workshop 3: Systems of Equations and Inequalities

- Part I: Solving systems of linear equations.
- Part II: Solving systems of linear inequalities graphically.

Teaching Strategies:

- Building understanding
- Teaching English language learners

About the Workshop, cont'd.

Workshop 4: Quadratic Functions

- Part I: Graphing quadratic functions.
- Part II: Modeling with quadratic functions and solving quadratic equations.

Teaching Strategies:

- Developing a community of learners
- Alternative assessment

Workshop 5: Properties

- Part I: Factoring basic quadratic expressions using algebra tiles and graphs.
- Part II: Understanding and using basic recursion to solve problems.

Teaching Strategies:

- The Rule of Four
- Patterns

Workshop 6: Exponential Functions

- Part I: Modeling exponential growth/decay problems, and understanding the growth/decay factor and the growth/decay rate.
- Part II: Understanding basic properties of exponents, including negative exponents and properties of exponents.

Teaching Strategies:

- Affective domain
- Instructional decision making

Workshop 7: Direct and Inverse Variation

- Part I: Exploring direct variation by recognizing and describing situations that involve direct variation.
- Part II: Exploring inverse variation by recognizing and describing situations that involve inverse variation.

Teaching Strategies:

- Questioning
- Concepts first, skills later

Workshop 8: Mathematical Modeling

- Part I: Understanding and interpreting rates of change as used in modeling situations, including fitting lines to data.
- Part II: Investigating number patterns and relationships that include linear and exponential functions.

Teaching Strategies:

- Listening
- Lesson study

Workshop Components

This guide provides everything you need to know to conduct this workshop, either with colleagues or on your own. The workshop consists of activities carried out with your colleagues on-site (Workshop Sessions) and those you do on your own (Between Sessions). See Helpful Hints for Facilitators on p. 4 for more information on preparing for group workshops.

Workshop sessions should be scheduled for a minimum of two hours. If you are watching a live broadcast, you will want to begin at least 30 minutes prior to the broadcast so that you can prepare for viewing both Part I and Part II before the program begins. Then you can discuss both parts after the 60-minute broadcast.

We recommend taping the broadcast and scheduling sessions at a later date, so that you can view and discuss each part separately, as described below.

Workshop Sessions (On-Site)

Each workshop session and video program is divided into two parts. Prior to each part, you will engage in a pre-viewing discussion/activity related to the topic (Getting Ready). Following each part of the video, you will discuss the pedagogy and the topic as it applies to your teaching (Going Further).

Between Sessions (On Your Own)

Homework Assignment

After each session, you will be assigned exercises and activities that will help you put into practice what you have learned. In addition, we recommend that you read the video teacher reflections at the end of each session's chapter in this guide.

Ongoing Activities

You may want to incorporate one or more of these three activities throughout the course of the workshop.

Keep a Journal

Keep a journal of your thoughts, questions, and discoveries from the workshop itself, and the learning experiences that take place in your own classroom. You are encouraged to use the algebra workshop journal at www.learner.org/channel/workshops/algebra.

Visit the Web Site: www.learner.org/channel/workshops/algebra

Go online for materials and resources designed to help you deepen your understanding and implement the practices shown in the workshop. On the Web site, you will find lesson plans based on the video lessons, information about the 16 algebra topics, and opportunities to explore the 16 teaching strategies highlighted in the workshop.

Share Ideas on Channel-Talkinsights@learner.org

You can subscribe to an email discussion list and communicate with other workshop participants online. To subscribe to Channel-Talkinsights, visit <http://www.learner.org/mailman/listinfo/channel-talkinsights>.

Helpful Hints for Facilitators

Successful Workshop Sessions

The following guidelines will help you conduct successful workshop sessions, particularly the Getting Ready and Going Further segments. These pre- and post-video group discussions and activities will help participants better understand the video programs and enhance the workshop experience. Getting Ready prepares participants for what to focus on during the video programs, and Going Further provides the opportunity to analyze and reflect on what they saw.

Designate Responsibilities

Each week, someone should be responsible for facilitating the on-site workshop session. This may be a professional facilitator or a volunteer from among the participants. Or you may choose to divide and rotate duties among several participants.

Prepare for the Workshop Session and Bring the Necessary Materials

The facilitator should review the entire session in this guide prior to arriving and determine if any materials are necessary for the session. The facilitator is responsible for bringing enough materials for the participants. If you are viewing the video programs on videocassette, the facilitator may also want to preview the programs and read the video teacher reflections at the end of each session's chapter.

Materials Needed

Participants will refer to printed materials during some workshop sessions. The materials can be found in the Appendix of this guide.

Before the First Workshop Session

You may want to photocopy this guide for all participants so they may follow along, refer back to ideas covered in the workshop, read the reflections written by the video teachers, and have their homework assignments handy. Or you may direct them to the workshop Web site at www.learner.org/channel/workshops/algebra, where they can print the guide themselves (direct them to Support Materials). It is not necessary for participants to have copies of the print guide before attending the first session.

Keep an Eye on the Time

We have suggested the amount of time you should spend on each question or activity. Please note that there are Getting Ready and Going Further activities wrapped around each half hour of video. We suggest that you record the broadcasts before your sessions so you can pause the tape between programs. If you prefer to watch the live 60-minute broadcast in session, then you will need to do both Getting Ready activities before the broadcast and both Going Further activities at the end.

Record Your Discussions

We recommend that someone take notes during each discussion or, better yet, that you tape-record them. If someone misses a session, the notes or tapes can bring the participant up to speed.

Share Your Discussions on the Web

The workshop sessions serve as a starting point to share and think about the workshop ideas. Encourage participants to continue their discussions with participants from other sites on the Channel-Talk discussion board at www.learner.org/channel/workshops/algebra.

About the Contributors

Karen A. Longhart, Math Content Director

A mathematics teacher for 22 years, Karen Longhart has served on the board of directors at both NCTM and the Montana Council of Teachers of Mathematics (MCTM), where she was also president. Recently she has been a presenter of algebra professional development institutes for the NCTM Academy. Karen was a Presidential Awardee for Excellence in Mathematics and Science Teaching, and has been named to the Mathematical Sciences Education Board for 2000-2003. MCTM honored her as Teacher of the Year. Karen is a prolific writer of mathematics curricula, including material for Texas Instruments' *Eighty Something*, and the Systemic Initiative for Montana Mathematics and Science (SIMMS).

Karen has contributed considerably to improving the use of technology in mathematics teaching. A recipient of National Science Foundation grants to study technology and teaching methods, she has written numerous successful grants to fund professional development and technology for teachers all over the state of Montana. She piloted SIMMS projects that promoted the use of technology, cooperative learning, and authentic assessment while teaching mathematics using real-world contextual situations.

L. Carey Bolster, Math Content Consultant

Carey Bolster has been vitally active in mathematics education throughout his career. He served as coordinator of mathematics for Baltimore County Public Schools and vice president and president of the National Council of Supervisors of Mathematics (NCSM), initiated the "Activities" section of *The Mathematics Teacher*, co-directed the State Institute for Leaders in Mathematics and Science sponsored by MSEB, consulted with the National Academy of Sciences development of its online project, and is an author for Scott Foresman.

Carey has been an innovator in bringing professional development to mathematics teachers through video and online productions. Currently he serves as co-mathematics director for the PBS mathematics adventure cartoon show, *Cyberchase*. As director of *PBS Mathline*, Carey developed over 72 videos and an extensive online interactive professional development network involving thousands of teachers. As co-principal investigator of the *Modeling Middle School Mathematics Project (MMM)*, he developed video and online activities highlighting exemplary mathematics curricula. Carey served as senior mathematics consultant for *PBS Teacherline*, an online initiative for math teachers. He initiated MathWeb 2000 and 2001, the first 100% online math conferences. He is president of Bolster Education, Inc., which specializes in creating content for videos, the Web, and other technologies used in professional development.

Classroom Teachers



Janel Green

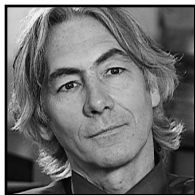
Walt Whitman High School; South Huntington, New York. Janel Green realized she was gifted in the field of mathematics at a very young age, and as a child, she tutored and assisted her siblings and friends in their math studies. A native of Brooklyn, New York, Janel received a bachelor's degree in mathematics from Queens College of the City University of New York, where she was the recipient of the Herbert Fremont Award, and went on to complete a master's of science degree in education. Currently, she is working toward an administrative degree at Queens College. She has taught mathematics at Walt Whitman High School for the past six years.



Peggy Lynn

West Yellowstone High School; West Yellowstone, Montana. Peggy Lynn has been teaching mathematics at West Yellowstone K-12 Schools for 18 years. For the last nine years, she has been using a standards-based integrated curriculum that is context-oriented and incorporates the use of technology. She has become a firm believer in this approach for teaching mathematics. Outside of school, Peggy is a board member and secretary for the Montana Council of Teachers of Mathematics, a board member and treasurer for the West Yellowstone Ski Education Foundation, and team coordinator for the USSA Intermountain/Northern Region junior cross-country ski committee.

About the Contributors, cont'd.



Mike Melville

Aptos High School; Aptos, California. Mike Melville has been teaching for 17 years. He has taught mathematics using traditional texts and curricula as well as reform-based strategies. In between his years of teaching, Mike spent 11 years working for a franchising company, becoming a manager in charge of franchise operations. From this experience, he realized how important it is that what students learn be connected to how they live in some meaningful way. As a teacher of mathematics, he received training in the reform pedagogy needed for the Interactive Mathematics Program (IMP) and has also trained other teachers in this curriculum. At Aptos High School, Mike has been a department chair and has worked on various committees to improve the math education for college-bound students.

and has co-presented at the Governor's Academy in Maryland.



Orlando Pajon

Bel Air High School; El Paso, Texas. Orlando Pajon is working as a math staff developer for the Ysleta Independent School District in El Paso, Texas. Previously he spent five years teaching mathematics at Bel Air High School. He completed the alternative certification program at the University of Texas at El Paso in 1999. Formerly an electrical engineer, Orlando received his Master of Science degree from L'vov Order Lenin Polytechnical Institute (now known as L'vov Polytechnical University) in L'vov, Ukraine. Orlando was born and raised in Cuba.



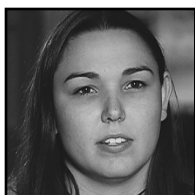
A. Tremain Nelson

Hastings High School; Houston, Texas. While working as a performance engineer with NASA, Tremain Nelson realized that his true passion was helping children succeed in school, and he decided to become a math teacher in the Houston area public school system. During this time, he had the opportunity to teach using the *Cognitive Tutor*[™] mathematics curriculum and become a certified implementation specialist for Carnegie Learning, Inc. He is currently serving as the director of K-12 Community for Carnegie Learning and works closely with math supervisors and fellow educators nationwide to help them increase their students' understanding of Algebra I, Geometry, Algebra II, and Integrated Math.



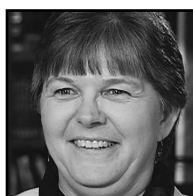
Tom Reardon

Austintown Fitch High School; Austintown, Ohio. Tom Reardon is the mathematics department chair at Austintown Fitch High School and a mathematics instructor at Youngstown State University. Tom has given numerous presentations at National Council of Teachers of Mathematics (NCTM) national and regional conferences and at Teachers Teaching With Technology national and regional conferences. He earned the Presidential Award for Excellence in Teaching Mathematics in 1997, the Radio Shack National Teacher Award in 2000, and the Toyota TIME grant from NCTM in 2003. He earned National Board certification in 2000. Tom has authored textbooks and worked with Texas Instruments on software development projects.



Jenny Novak

River Hill High School; Clarksville, Maryland. Jenny Novak is a fourth-year teacher and is involved in many professional development activities for the Howard County Public Schools in Maryland. She has been a member of the curriculum development team for Algebra I and has served as the lead for the Algebra II writing team. Jenny has co-taught an intermediate course on graphing calculators for teachers, and for the last two summers, she has led an "Algebra Institute" course for Howard County's new teachers. She has presented at county in-services and the N.S.A. Mathematics Symposium,



Sarah Wallick

The International School; Bellevue, Washington. Sarah Wallick is currently in her third year of teaching at the middle and high school levels in a Washington State public school. She is also pursuing a master's degree in Educational Leadership and Policy Studies at the University of Washington, and is working toward administrative certification to become a principal. Sarah is a trainer for The College Board's "College Success Initiative," which aims to improve math and language arts studies at the middle school level so that students will be better prepared to

About the Contributors, cont'd.

succeed in those subjects when they enter college. Before moving to Washington, Sarah taught mathematics in California. She holds a Bachelor of Science degree in Applied Mathematics from California State University, Stanislaus, where she also received her teaching certification.



Patricia Valdez

Aptos High School; Aptos, California. Patricia Valdez teaches mathematics in English and bilingually in English and Spanish. She has been a staff developer for the Interactive Mathematics Program (IMP) for 10 years, and has taught other IMP staff developers nationally. Patricia has taught at the prestigious California Academy of Mathematics and Science (CAMS) and in the Los Angeles Unified School District. Patricia was the first person to earn a mathematics degree with a bilingual cross-cultural credential from the California State University at Long Beach. She was born in Mexico City.

East Elmhurst, New York. A former member of the NCTM board of directors, she served on a special panel appointed by the New York City schools chancellor to investigate and report on the state of mathematics education in New York and to provide recommendations for improvement. Currently she is co-principal investigator of a project to develop scenario tasks as a means to assess teachers' mathematical and pedagogical content knowledge.



Miriam Leiva

Dr. Miriam Leiva is director of MATHink and Project Excel MATH, professional development programs at the University of North Carolina at Charlotte that link classroom teachers and schools. She is the Bonnie E. Cone Distinguished Professor of Mathematics Emerita at UNC and was one of the first Hispanic-American women for whom English is a second language to receive a doctorate in mathematics and mathematics education in the United States. Dr. Leiva is serving as the first president of TODOS: Mathematics For All, a national organization designed to support and assist educators in teaching mathematics, particularly to Hispanic-Latino students. She led the first U.S.-Cuba Mathematics Education Conference in Havana in 2004.

On-Camera Commentators



Diane Briars

Diane Briars is the senior program officer for mathematics and science education for Pittsburgh Public Schools, and co-director of the Pittsburgh NSF Urban Systemic Program PRIME-PLUS (Pittsburgh Reform in Mathematics Education and in Programs for Learning and Understanding Science). She was a member of the National Commission on Mathematics and Science Teaching for the 21st Century, headed by John Glenn; a member of the advisory committee for the Education and Human Resources Directorate of the NSF; and a former director of NCTM.



Carol Malloy

Carol Malloy is an associate professor of mathematics education at the University of North Carolina at Chapel Hill. She has served on the NCTM board of directors and was member of the NCTM Standards 2000 team. Dr. Malloy's research interests include mathematics learning, the influence of culture on the cognitive development and mathematics learning of African-American students, and teacher-student interactions that lead to understanding in mathematics. Prior to becoming a professor, she was the associate director for programs, as well as director of the pre-college program, at the University of North Carolina Mathematics and Science Education Network.



Frances R. Curcio

Dr. Frances Curcio is a professor in the Department of Education and Youth Services at Queens College of the City University of New York. She is permanently certified as a secondary school mathematics teacher and administrator and spends part of her teaching time at the Louis Armstrong Middle School in

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Beatrice Moore-Harris is the associate mathematics manager for Project Grad Houston. Her consulting clients include Glencoe/McGraw-Hill Publishing Company, the Bureau of Education and Research, the Texas Association for Supervision and Curriculum Design, and the Texas Rural Systemic Initiative. She was an NCTM board member and is the past president of the Benjamin Banneker Association. She has published numerous articles, and has worked on several educational committees and projects at the national level.



Anthony Piccolino

Anthony Piccolino is associate professor of mathematics at Montclair State University, and a co-project director for an NSF-funded Systemic Initiative for teachers and administrators in grades K-8 in the Newark Public Schools. Prior to this, he was a middle and high school teacher and supervisor of mathematics in the New York State public school system. A co-author of the high school textbook series *Integrated Mathematics* published by McDougall Littell, he has served as a consultant in AP Mathematics for the College Board during the past 20 years. Past directorships include president of the Association of Mathematics Teachers of New York State and the New York State Association of Mathematics Supervisors, and first and second vice president and Eastern regional director for the National Council of Supervisors of Mathematics (NCSM).



Jane F. Schielack

Dr. Jane F. Schielack is a professor of mathematics at Texas A&M University. Recently she served as academic advisor as well as writer on several professional development institutes for middle school mathematics teachers. Her other experiences include designing the on-line Mathematics TEKS Framework for supporting implementation of the Texas Essential Knowledge and Skills in K-12 mathematics. Currently she is director of Information Technology in the Science Center for Teaching and Learning at Texas A&M University. The center seeks to replenish the nation's supply of education specialists

in science, mathematics, and technology through learner-centered opportunities involving scientists, mathematicians, education researchers, and education practitioners.



David C. Webb

David Webb is the executive director of the Freudenthal Institute USA, an international research collaborative for mathematics education, as well as an associate researcher at the Wisconsin Center for Education Research. His research focuses on teachers' classroom assessment practices and the design of professional development resources to support teacher learning. Recent research projects have focused on teacher modification through classroom assessment, the impact of reform curricula on student learning and achievement, and the design of formative assessment tools. David received his Ph.D. in curriculum and instruction from the University of Wisconsin, Madison.

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