

Preface

The **Rational Number Project** (RNP) is a cooperative research and development project funded by the National Science Foundation. Project personnel have been investigating children’s learning of fractions, ratios, decimals and proportionality since 1979. This **book of fraction lessons** is the product of several years of working with children in classrooms as we tried to understand how to organize instruction so students develop a deep, conceptual understanding for fractions.

- **These lessons** provide teachers with an alternative to the textbook scope and sequence for fraction instruction and are appropriate for students in grades 4 - 8.
- **These lessons** will help students develop number sense for fractions because they invest time in the development of concepts, order, and equivalence ideas.
- **These lessons** provide students with daily “hands-on” experiences. Fraction circles, chips and paper folding are the manipulative models used in the level 1 lessons.
- **These lessons** provide teachers with daily activities that involve children in large group and small group settings. All the lessons involve students using manipulative materials. Our work

with children has shown that students need extended periods of time with manipulatives to develop meaning for these numbers.

- **These lessons** offer teachers insights into student thinking as captured from the RNP research with children. The “Notes to the Teacher” section shares examples of students’ misunderstandings, provides anecdotes of student thinking, and contains information on using manipulative materials.

- **These lessons** will help teachers and students attain the goals set for fractions by the National Council of Teachers of Mathematics in their *Curriculum and Evaluation Standards*.
 - ~ Students will represent fractions using multiple concrete models.
 - ~ Students will apply fraction ideas to real-world situations.
 - ~ Students will have opportunities to reflect on their thinking about fractions using their informal language as they try to make sense of the formal symbolic system.
 - ~ Students will have opportunities to make connections among different ways to represent fractions: real world, concrete models, pictures and symbols.

- **These lessons** delay development of operations with fractions until students have developed meaning for fraction symbols. The lessons develop understanding of the operations with fractions by using story problems and fraction circles. Estimation is emphasized throughout.

- **These lessons** have been used with over 1600 students. Teachers’ response to them have been uniformly enthusiastic. Results of

pilot testing show significant differences in students' performance between students who used these lessons as compared to students who used the textbook for fraction instruction. Students using the RNP lessons outperformed students using the textbook. Marked differences in thinking were noted in the pilot study. Students using the RNP lessons thought about fractions in a conceptual manner, while students using the textbook thought about fractions in a procedural manner.

- **These lessons are for teachers who know from their own experience with children that there must be a better way to teach fractions!!! Students who use these lessons will develop concepts and will be able to operate on fractions meaningfully.**