Status Quo
Fractions are a crucial math skill and a prerequisite for algebra and geometry.

Difficulty with fractions "is pervasive and is a major obstacle to further progress in mathematics."

Approach
Remove the fractions bottleneck through:
- a game world devoted to fractions
- a research platform for testing educational theories
- data-driven customization for each student
- discovery of optimal learning pathways for fractions
- providing a target-specific tool for teachers

Refraction is an online Flash puzzle game that teaches fractions through partitioning lasers and helping animals who have gotten stuck.

The player must provide exactly the right fraction of the laser to each animal

Splitters partition lasers equally and redirect them

The player uses lasers to help the animals

Refraction teaches fractions through three models: laser width (continuous), flow frequency (discrete), and lasers colored by denominator.

Community Involvement
Players can design challenges for each other using the level editor.

Learning Efficacy
A pilot study showed that if children have gone through initial levels, they make fewer wrong moves the more they play, even as the fraction concepts get harder.

Impact
Deploy Refraction to thousands of students through K12 Virtual Academies, starting in Fall 2010

Provide a massive player base for educators and researchers
Create a community of students and mentors
Solve key educational questions in months, not years

Learn fractions and improve education by playing a puzzle game.