



Discovery Education

case study

sixredmarbles

revolutionizing the math classroom
through curiosity and exploration

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revolutionizing the math classroom through curiosity and exploration

A challenge to revolutionize how math is taught and learned

Discovery Education LLC is a leading global provider of high-tech, media-rich educational content and services in the K–12 space. Discovery approached Six Red Marbles to partner in the design and development of a revolutionary all-digital “Techbook” for middle and high school math across all subjects. Their existing Techbook model engaged students with dynamic media and content, but they wanted Math Techbook to do something far greater: foster deep understanding and a true appreciation of the beauty and usefulness of math through a completely student-driven, inquiry-based approach. This was to be no traditional textbook!

Six Red Marbles’ Learning Experience Design Process

Learning Experience Design

Learning Experience Design (LX) quickly creates concepts for learning products that from the outset of projects are known to be of high value and effectiveness for the target learners and stakeholders. Six Red Marbles’ (SRM) LX model has been created and refined to be evidence-based, extremely learner-centric, and rigorous. Above all else, the process is intentional and flexible. Every project is different, and it is our practice to carefully match what we do to the specific needs of each project.

The Six Core Principles

As a starting point for any project, teams consider Six Core Principles—the foundation for Six Red Marbles' Natural Learning Approach™:

- 1 Neuroscience knows best
- 2 Tribal pedagogy works
- 3 Play is productive
- 4 Curriculum must adapt
- 5 Technology is today
- 6 Easy see, easy do.

An Iterative Approach

Six Red Marbles' Learning Experience Designers and Curriculum Specialists know that to get good results, iteration is key. With Discovery Education, we:

- Considered the challenge and solution from every angle
- Sought to understand the intended learners
- Worked closely with the client to understand their needs and aspirations
- Analyzed relevant educational theory and pedagogy
- Created a rubric to guide design and perform quality control of content
- Iterated through multiple brainstorming and review sessions until each lesson met stringent standards

SIX CORE Principles IN ACTION

We use our Six Core Principles as a starting point for every project. Here are some ways the principles played a role in our project with Teaching Strategies.



Neuroscience knows best Our concepts generate affective engagement to the learning experience through mechanisms that recruit interest, encourage persistence, and increase motivation.



Tribal pedagogy works Case studies and apply challenges link content areas to their usage in the classroom.



Play is productive Teachers set goals and then choose their own path to achieving them. They are able to track their progress as they advance to higher levels of understanding.



Curriculum must adapt Teachers determine their goals. That way, teachers are able to focus on material that is most directly relevant to them.



Technology is today All of the concepts created for Teaching Strategies recommend leading edge learning technology in areas such as LMS with custom platform development, and mobile.



Easy see, easy do The user interface for each concept is intuitively designed, easy to navigate, and optimized for an engaging learning experience.

Discovery Education's Goals

Discovery Education tapped the best creative minds in the business to design and build a revolutionary Math Techbook that:

- Provides rich and relevant scenarios for students to explore and experience the joy of mathematical inquiry
- Engages students through multiple means with digital interactives, hands-on activities, games, video-based investigations, and self-directed “messy” projects
- Fosters development of the Common Core Mathematical Practices and 21st century skills through collaboration, peer mentoring, sense-making, and creating and justifying arguments
- Integrates the Common Core State Standards for Mathematics from inception rather than through an added layer to promote true, deep conceptual understanding
- Encourages teachers to step back and act as guides rather than directors of students’ educational journeys

Six Red Marbles shared in this vision and was the perfect thought and execution partner to make it a reality.

Project Execution

Team

Six Red Marbles assembled a project team that maximized value to Discovery Education and the quality of the ultimate experience:

Curriculum Experts—Created best-in-class content aligned to the Common Core content objectives with an emphasis on focus, coherence, and rigor, ensuring that experiences were student-driven and followed a strict inquiry approach.

Learning Experience Design (LX)—Conducted design research, produced ideations of concepts to address project goals and learner needs, aligned technology to needs, integrated current ideas from pedagogical theory and the learning sciences.

Production—Created rich, engaging illustrations and instructional graphics and scoured the web for top-notch photography.

Project Management—Ensured efficiency and timely delivery of project milestones.

Process

Taking a highly collaborative and interdisciplinary approach, Six Red Marbles and Discovery Education orchestrated a four-stage brainstorming, outlining, storyboarding and production process.

Brainstorming

Representatives from all functions (LX, UX, Curriculum) met to ideate and produce draft design documents for over 1,000 inquiry-based learning experiences. Ideas were pitched, refined, combined, and reordered until the team had agreed upon a blueprint for each lesson.

Outlining

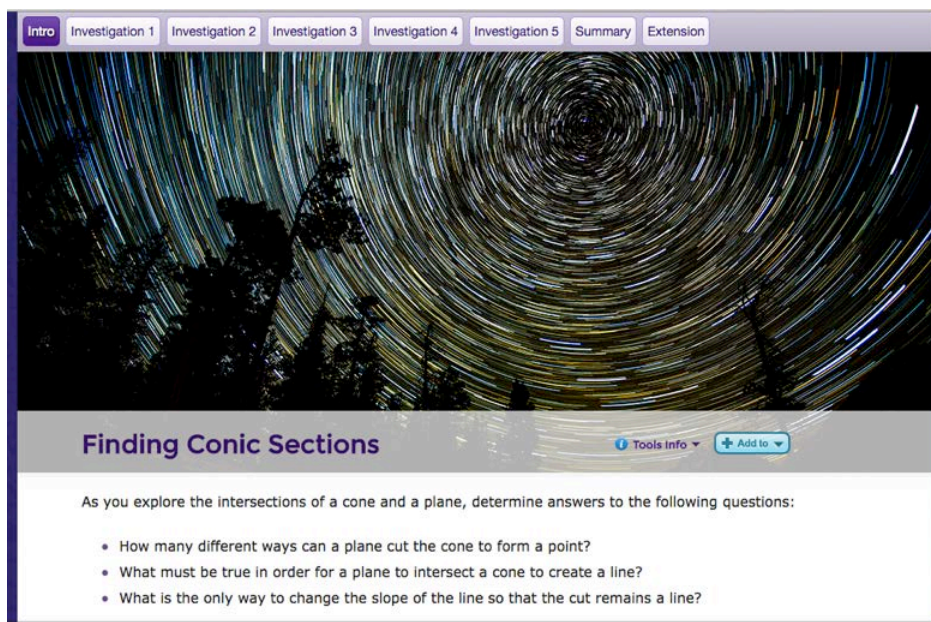
Once the blueprint for a lesson was ready, Six Red Marbles' team of math writers shaped it into a cohesive, detailed outline demonstrating the flow of each Investigation and how the Techbook resources would be leveraged to support student inquiry.

Storyboarding

After several rounds of review and revision between the different functions at Six Red Marbles and Discovery Education, outlines were deemed final, and storyboarding commenced. Writers used a series of custom templates to specify every detail of the content, flow, and behavior of a lesson, then LX Designers reviewed and edited the storyboards to ensure clarity, cohesion, and maximum engagement.

Production

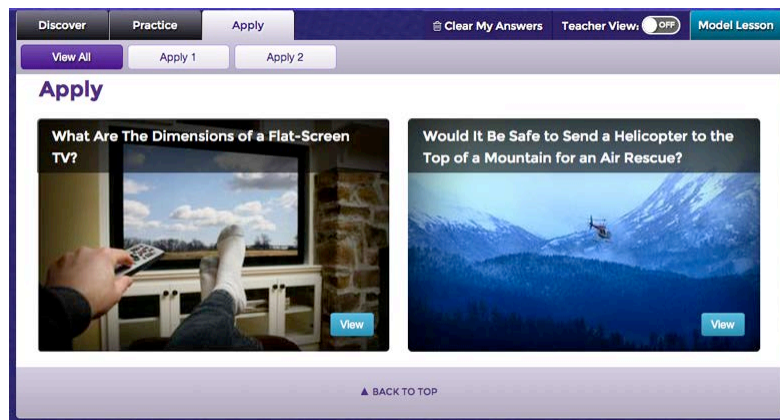
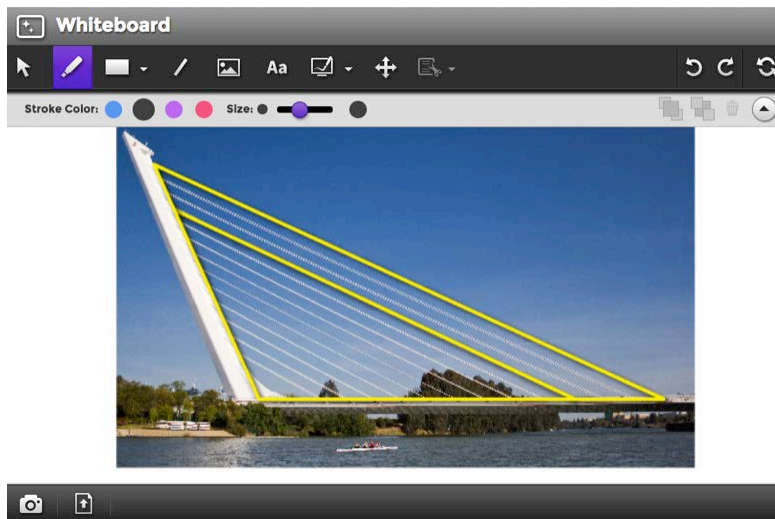
Once storyboards were approved, a flurry of production workflows went into effect. Artists created custom illustrations and graphics, photo researchers sourced engaging imagery to meet Discovery Education's exceptionally high standards, and technologists prepared the systems and tools to bring all of the team's hard work to life.

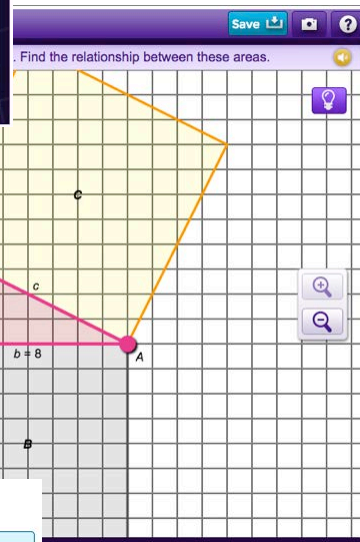
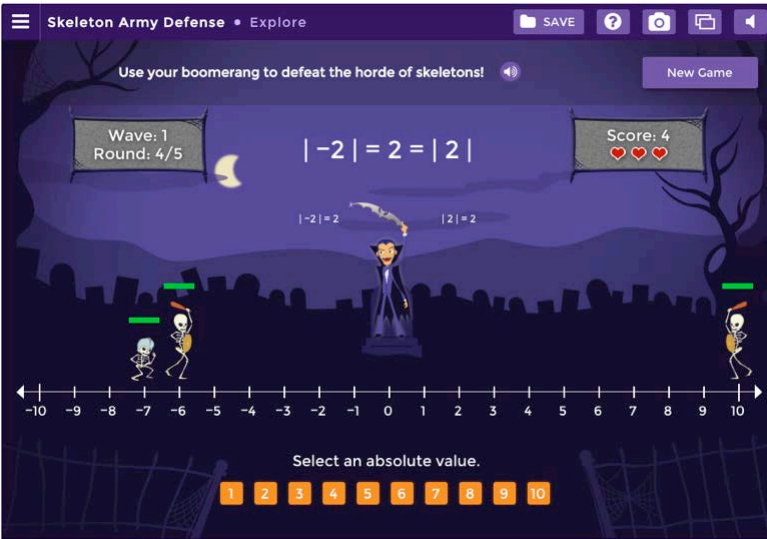


Results

At the end of over a year-long development process, Discovery Education was ready to launch the most innovative and exciting product to hit the K–12 math market in years. The Math Techbooks for grades 6, 7, 8, Algebra I, Algebra II, and Geometry include hundreds of authentic, real-world “problems worth solving” for students to work individually or in small groups, with teachers taking a backseat to allow students’ natural inquiry and curiosity to drive their learning.

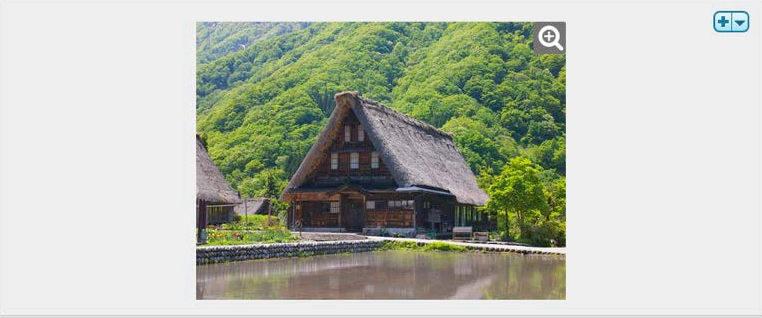
Students are pushed to question their assumptions, conduct research to fill in messy data gaps, form and justify hypotheses, and challenge each other’s thinking in a collaborative approach that fosters critical thinking and other critical 21st century skills.





Proving the SSS Triangle Similarity Theorem

Teacher Note
 In this investigation, students analyze givens and relationships to develop a plan for their proof, MP.1. They critique proof plans and construct viable arguments, MP.3. Students should work in pairs or teams of three to complete this investigation to provide opportunity to brainstorm solution pathways.



Custom interactives allow students to manipulate foundational concepts in an open and exploratory way.

Teacher Learning Dashboard

Unit 5: Equivalent Expressions | Concept 2: Analyze Algebraic Expressions CHANGE ^

UNIT 1: Signed Numbers

UNIT 2: The Rational Number System

UNIT 3: Ratios and Proportions

UNIT 4: Proportional Reasoning and Scale

UNIT 5: Equivalent Expressions

UNIT 6: Equations and Inequalities

UNIT 7: Populations and Samples

UNIT 8: Probability of Random Events

UNIT 9: Probability of Multiple Events

UNIT 10: Angles, Triangles, and Polygons

UNIT 11: Circles

CONCEPT: Interpret Algebraic Expressions >

CONCEPT: Analyze Algebraic Expressions >

CONCEPT: Combine Algebraic Expressions >

UNIT 1: **Teacher Learning Dashboard**

Unit 4: Conic Sections | Concept 1: Analyze Graphs and Equations of Circles and Ellipses CHANGE v

Discover Practice Apply


Intro Investigation 1 Investigation 2 Investigation 3 Investigation 4 Investigation 5 Extension

Class: Select Class Hide Names

Teachers can use an assortment of tools to capture and annotate student responses and display them for class discussion, and “Model Lessons” guide teachers in implementing and overseeing the rich experiences that Techbook offers.

Value to Discovery Education

Discovery Education engaged Six Red Marbles to serve as thought and execution partner in creating a product to revolutionize the world of mathematics education. The end result is a truly different and exciting educational product. Discovery unveiled Math Techbook at a panel of experts and guest speakers in early 2015 to an overwhelmingly excited response. Techbook has since won numerous adoptions throughout the country. Given Six Red Marbles' extensive capacity and expertise for every stage of the design and development spectrum, leaders at Discovery Education recently expressed the sincere belief that no other partner could have made this product a success.



value



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We design and build learning
experiences for all ages.

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