Woodworking, Math and More

A Hands-On Approach to Academic Understanding

The Spinning Tops Project
By Chris de Firmian

Project-Based Learning

- Hands on approach
- Experiential
- Multi-subject

Box Drum

- History - originated in Africa
- Geography - equator, continent and west coast
- Physical Science - sound wave travel and distance
- Music - timings
- Art - improvisation

Sailboat Model

- Science - ocean currents and wind patterns
- History - trade route development
- Physics - sail creates lift
- Language - maritime word origins
- Art - complementary colors

Cigar Box Guitar

- History – Pythagoras and Great Depression
- Physics – resonation and sound holes
- Math - fret board layout
- Repurposing

Core Connection

- Physical Science – see and feel how concepts work
- Math – becomes more real with touch
- History – becomes more relevant with connection
- Subjects are inter-related
- Multi-grade level

Spinning Tops

Math

K-3rd

- Model with Math
- Analyze 2- and 3-dimensional objects
- Geometric measurements
- Compare measurable attributes

6th-8th

- Proportion relationships
- Probability model
- Reason abstractly
- Formulas for volume, area and circumference

Spinning Tops

Physical Science

K-3rd

- Tools are used to apply force
- Force creates movement
- Motion of objects can be observed and measured

6th-8th

- Develop a hypothesis
- Perform investigation
- Motion
  - Velocity
- Forces
  - Magnitude
  - Friction
  - Mass

Spinning Tops

Social Studies/History

- Students analyze social aspects of early civilizations
  - Egypt, China, Greece, Rome and India
- Students examine the exchange of ideas
  - Medieval and Middle Ages

Tops Found In Nature

Acorn

Turban Shell

Historical Tops

Wooden Top
2000 B.C. Egypt

Ivory Top
19th Century England

Tops From Different Cultures

Dreidel

Modern Japanese Tops

Spinning Tops

Visual Arts

- Replicate patterns in nature
- Create 3-dimensional arrangements
- Experiment with color
- Demonstrate skill in the manipulation of materials
- Describe how balance and symmetry are used in art
- Discuss art objects from various places and times

Spinning Tops

The Process-Part One

- Students arrange wooden rings
- Students build tops around the center shaft
- Instructor will emphasize
  - Momentum
  - Friction
  - Compression
  - Driving Force

Spinning Tops

The Process-Part Two

- Students will
  - Explore color combinations
  - Critique
  - Collaborate

Round and Round

Concepts

- Stability
- Center of Gravity
- Rotational Force
- Mass
- Shape
- Diameter
- Speed/RPM
- Predictions

Collaborative Learning

- Peer Learning
- Non-Competitive
- Social Skills

Project Development

- Grade Level
  - 1st grade
  - High school
- Subject
- Project
  - Age
  - Capabilities
  - Interest