

Simple and Motorized Mechanisms

Use the following information when requesting grants for manipulatives used to teach physical science concepts for Grades 5 and up.

Need Statement

The issue in my elementary classroom is **(select an area of issue below)**.

Issue 1: students have low interest and engagement levels.

Issue 2: students are struggling with problem-solving skills.

Issue 3: students are not engaged in learning math and science.

Issue 4: students have extremely diverse abilities.

Issue 5: too few opportunities for creative or project-based learning.

Issue 6: a lack of good opportunities for students to communicate in the language of mathematics and science, both orally and in writing.

Issue 7: students need to learn how work effectively in teams.



Project Description

My solution is to engage students in a cross-curricular, hands-on learning environment using Simple & Motorized Mechanisms.

The Simple & Motorized Mechanisms Base Set and curriculum options are based on constructivism. This educational theory states that children learn best when they experience things firsthand and within a meaningful context.

The curriculum, which is aligned to national standards, engages students to become more independent learners. The 21st-century skills they will develop include problem solving, comprehension, communication, creativity, and critical thinking.

It creates a learning environment that addresses the challenges associated with **(area of issue)**.

(Add statements as needed to show how you will address the area of issue utilizing the curriculum.)

The use of LEGO bricks® helps students overcome difficulties and persevere when a first attempt does not work. Students stay motivated to continue to try and learn rather than give up.

Through this curriculum, **(number)** students will learn how to design and create working models that represent machines or machine components used in real life.

- Build models around themes that push brainstorming.
- Analyze cause and effect.
- Make observations during testing.
- Display and communicate data.
- Create working models.

These experiences expand a student's knowledge of simple machines and how to make them move and interact to solve problems. Additionally, these experiences will help students hone speaking and listening skills as they present their ideas and listen to the ideas of others.

The curriculum includes open-ended problem-solving activities that engage students.

Students will demonstrate an increased ability to comprehend and solve basic problems more effectively by applying their science, technology, engineering, and mathematics skills to address challenges they encounter through the lessons. Additionally, these experiences will help students develop a better attitude toward solving problems and increase their confidence.

Skills assessment will take place through student presentations, ongoing observation, and written work.

(Add information on current scores in mathematics, science, and so forth. Or other issues as it pertains to this grant to reemphasize need and the increases you hope to achieve.)

(Add information on the standards and types of lessons you will utilize in this program to achieve the growth indicated in the paragraph above. Be specific about the way you will implement the program so readers will understand exactly how the program will help students succeed in math.)

Curriculum Information

(Select relevant description options. Be sure to include information on the area of issue. Add additional statements to show how you will address area of issue using Simple and Motorized Mechanisms.)

Simple & Motorized Mechanisms Base Set

Students will build and explore machines and mechanisms, investigate motorized machines, calibrate and capture wind, and study gearing mechanisms with this base set. The set contains 396 LEGO Technic elements and full-color building instruction booklets for 10 principle models and 18 main models, all in a sturdy storage bin that includes a sorting tray.

Combine the Simple & Motorized Mechanisms Base Set with curriculum-relevant activity packs to carry out a broad range of activities within design technology, science, and mathematics:

- Introducing Simple & Motorized Mechanisms
- Advancing Simple & Motorized Mechanisms
- Pneumatics Add-On Set and Activity Pack
- Energy Add-On Set and Activity Pack

Option 1: Introducing Simple & Motorized Mechanisms

When used with the Simple & Motorized Mechanisms Base Set, this activity pack gives students a fundamental understanding of simple machines, structures, and mechanisms.



- Investigate the principles of simple machines, mechanisms, and structures.
- Experiment with balanced and unbalanced forces.
- Measure distance, time, speed, and weight.
- Investigate powered forces and motion, speed, and pulling power.

The activity pack provides 30 lessons featuring 37 principle model activities; 14 main activities, each with extension activities; and six problem-solving activities.

The CD-ROM includes teacher's notes, student worksheets, and glossary. This program enables students to learn the underpinning of physical science, preparing them for further study in robotics, especially using LEGO MINDSTORMS Education EV3.

Option 2: Advancing with Simple & Motorized Mechanisms

When used with the Simple & Motorized Mechanisms Base Set, this activity pack enables students to get an in-depth understanding of simple machines, mechanisms, structures, and mechanical advantage.

- Explore mechanical advantage.
- Experiment with balanced and unbalanced forces, equilibrium, and more.

The activity pack provides 20 lessons featuring 38 principle model activities, four main activities including extension activities, and eight problem-solving activities. Real-life video clips introduce students to the activities. Teacher's notes, student worksheets, and glossary are also included.

Option 3: Pneumatics Add-On Set and Activity Pack

Combining the set with the Simple & Motorized Mechanisms Base Set enables you to carry out engaging cross-curricular activities.

- Explore power systems and components.
- Experiment with sequence and control, pressure, prototyping, kinetic and potential energies, and more.

The add-on set features 14 principle model activities that introduce students to the basics of pneumatics. In addition, four main models and activities and two additional open-ended problem-solving activities thoroughly educate students about pneumatics. The set features 31 specialty elements including pumps, cylinders, valves, an air tank, tubes, and a manometer.

The Pneumatics Activity Pack includes 14 principle model activities, four 45-minute pneumatics lessons each with extension activities, and two additional problem-solving tasks. Also includes video clips of real-life machines, printable worksheets, and teacher materials. This activity pack is appropriate for fifth grade and up.

Option 4: Renewable Energy Add-On Set and Activity Pack

Students explore renewable energy sources; investigate energy supply, transfer, accumulation, conversion, and consumption; and use measurements and data analysis to describe and explain outcomes through hands-on activities and exciting, real-life models.

The Renewable Energy Activity Pack includes six 45-minute lessons and four problem-solving activities. It also includes a wide range of real-life images, teacher's notes, student worksheets, and glossary.



Professional Development

This workshop consists of hands-on activities, communication, reflection, and application that are tailored to meet the needs of the participants.

The workshop lets participants experience being both a student and a teacher as they learn how to apply the concepts behind simple and complex machines within science and math curricula and practice differentiated instruction.

Participating in the workshop leads to a greater understanding of how LEGO Education creates an environment where all students can share their ideas and knowledge. It also provides the tools necessary to engage students throughout the year by connecting the possibilities of the Simple & Motorized Mechanisms Base Set and lessons with the required curriculum.

Learning theory

- Apply the 4Cs in the classroom.
- Awaken students' interests in given subjects.

Hands on

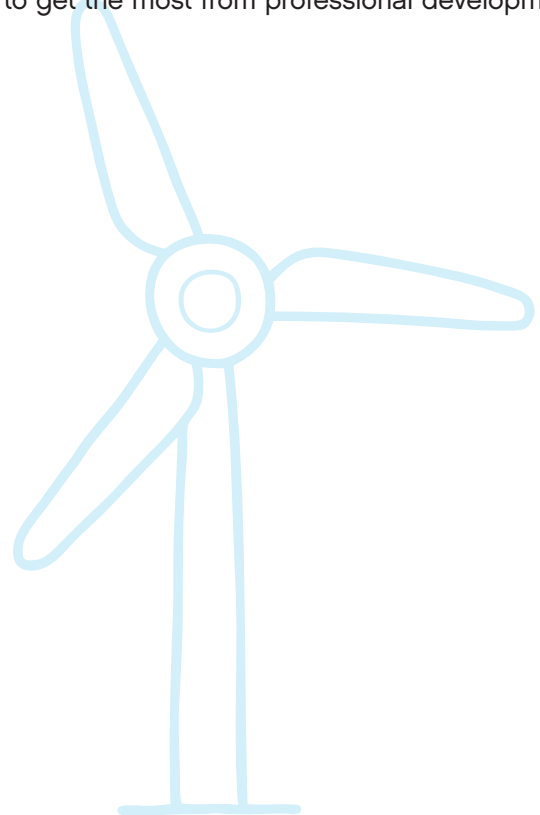
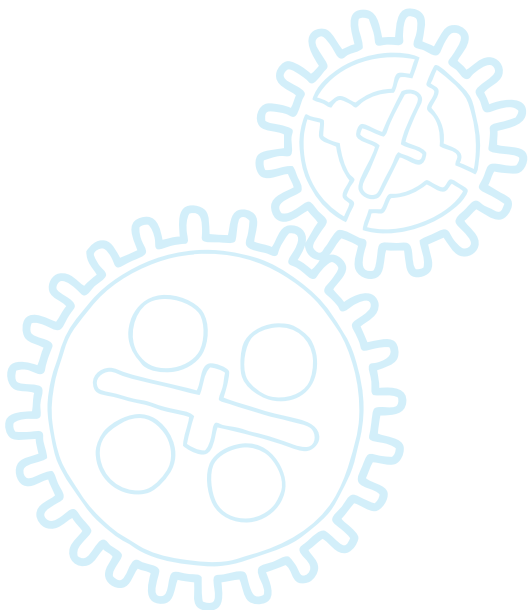
- Build machines and see how they can teach specific concepts to gain confidence in the classroom.
- Learn how to begin and how you can take a simple concept and make it complex through a series of intermediate steps.

Tools for planning

- Explore ways to apply the Simple & Motorized Mechanisms Base Set and lessons to curricula.
- Share ideas with other participants and leverage best practices to get the most from professional development.

Materials management

- Organize and label the materials and do periodic inventory.
- Keep the sets organized and ready for student use.



education