EASE EuropeAn network of steam Educators

Lesson Plan

Title: Building a Toy Car- An Engineering Approach

Grade Level: 3rd - 5th Grade

STEAM Areas: Technology, Arts, Engineering

Materials Needed:

- Cardboard or foam board for chassis;
- Plastic bottle caps or CDs for wheels;
- Wooden skewers or plastic straws for axles;
- Balloon and/or rubber band for power source;
- Tape;
- Scissors;
- A ruler.

Objectives: Students will understand basic principles of engineering and physics by building a toy car. They will learn about various components of a car and their importance. On completion, students should be able to explain how the materials they chose affect the motion and distance of the car.

Procedure:

- Introduction (5 minutes)- Start the lesson with a brief discussion about the components of a car and their functions. Explain to the students that they will be building a toy car using simple materials as part of their science or engineering project.
- Discussion on Material Selection (10 minutes)- Discuss the different materials the students can use to build their toy car. You can use a variety of materials such as corrugated cardboard, foam, or plastic bottles for the chassis/body. For the wheels, use round objects like bottle caps or CDs. For axles, materials like wooden skewers, plastic straws, or pencils can be used. The choice of materials can impact how the car moves and how far it can go, encouraging students to think critically about their choices.
- Chassis Building (20 minutes)- Direct the students to start building the chassis of their toy car. Depending on the materials chosen, they can use scissors to cut and shape their car body. Ensure they're supervised during this process for safety.

Procedure:

- Wheel Creation and Addition of Friction (30 minutes)- Next, guide them on how to make the wheels of their car. If bottle caps or CDs are used, students should ensure that the wheels are symmetrical for smooth motion. Discuss the importance of adding friction to the wheels for better traction, which can be done by wrapping rubber bands around them.
- Axles Assembly (20 minutes)- Cover different ways to construct and attach the axles. Axles can be made from wooden skewers or plastic straws, and different ways to attach the wheels could include taping the skewer directly to the wheel or using a straw as a connector. Allow time for assembly.
- Power Source (25 minutes)- The power source is key to propelling the car forward. Guide students in making a balloon or a rubber band car, explaining both procedures. For the balloon car, they can tape a balloon to a straw, and attach it to the car. In a rubber-band car, the students can tie one end of a rubber band to the axle and the other end to the chassis.
- Trial and Observations (30 minutes)- After the cars are built, it's time for a test run. Students can see how far their cars travel and make observations on the performance of their cars. They should document these observations for further discussions.
- Wrap Up and Discussion on Variables (20 minutes)- End the lesson by discussing independent and dependent variables relating to the toy car project. The independent variable could be the type of wheel used or the weight of the car, whereas the dependent variable could be the distance travelled by the car. This would introduce them to basic concepts of scientific experimentation.

Please note every time frame is flexible and should be adjusted based on the pace of your students' learning and the time required for discussions/feedback. By following the above procedure, your students will have a hands-on, practical understanding of the principles of engineering, material selection, and basic physics involved in moving vehicles.

Assessment: Students will test their cars and observe how far they go before they come to a stop. They will also discuss how changing the type of wheels or the weight of the car (independent variable) may affect the distance travelled.

References:

- https://www.youtube.com/watch?v=STL3JCWDOIY
- https://www.sciencebuddies.org/science-fair-projects/project-ideas/PHYS_P099/physics/balloon-powered-car-challenge