Backyard Engineers: Bringing Efficient Design To a Water Balloon Fight

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Game Description

Backyard Engineers is a game about the engineering design process. In *Backyard Engineers*, players create catapults to launch water balloons and win battles in the great neighborhood balloon fight. Players will need different catapults to meet different challenges, and will have to balance design characteristics (like mobility, energy use, stability, and efficiency) with their goals as they try to build the best catapult for the job. After making design decisions, players can test their catapults and adjust their designs before joining the battle and laying siege to the backyard.

Using the Engineering Design Process

Players can experiment with the trade-offs between the design and materials used and stability, accuracy, range, and soaking area of their resulting water balloon catapult. They can try out each design in the field, making adjustments as desired, and when they are certain the design meets their goal, they can put it to the test and evaluate their results with respect to efficiency benchmarks (see Figure 1). This process can be repeated as players complete each level (see Figure 2).
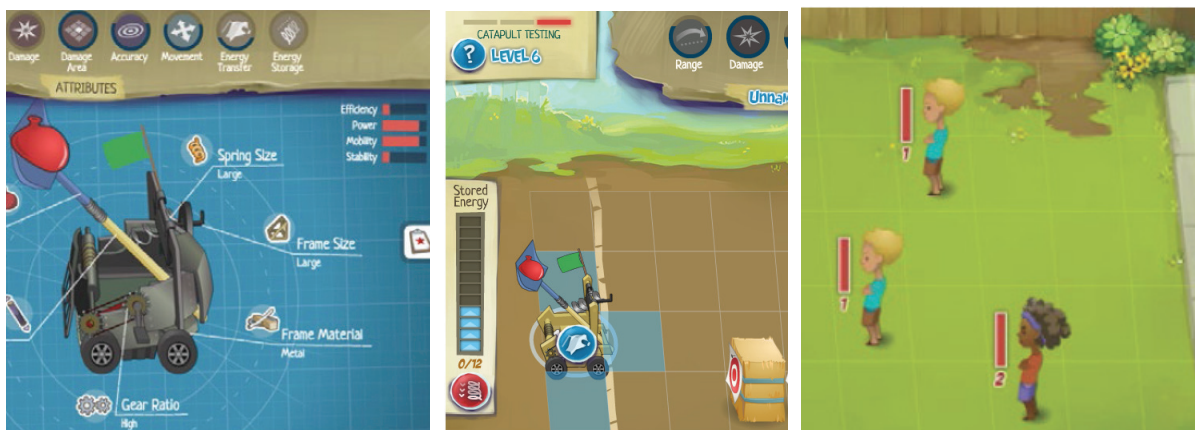

Figure 1: One round of catapult building, testing, and deployment
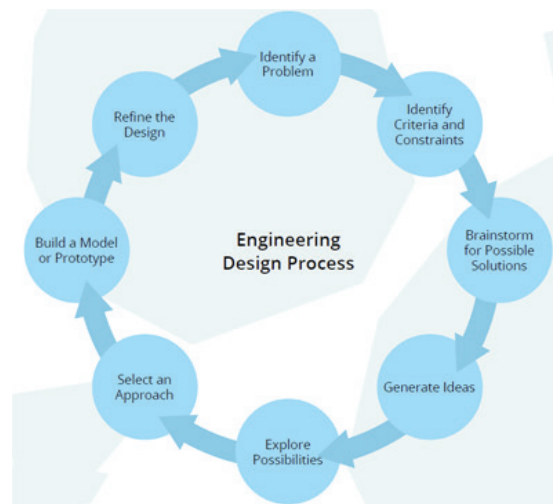

Figure 2: The engineering design process in *Backyard Engineers*

Learning Objectives

Students will be able to use the engineering design process to adapt and refine their catapult designs to meet their design goals efficiently.

Target Population

Backyard Engineers targets 6th - 8th grade students in classroom environments.

Next Generation Science Standards (2013)

MS-ETS1.A: Defining and delimiting engineering problems
MS-ETS1.B: Developing Possible Solutions
MS-ETS1.C: Optimizing the Design Solution
(NGSS Lead States, 2013)

Common Core State Standards

CCSS.ELA-Literacy.RST.6-8.3: Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

CCSS.ELA-Literacy.RST.6-8.8: Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.

(National Governors Association Center for Best Practices et al, Council of Chief State School Officers, 2010)

Development Process and Teacher Feedback

Backyard Engineers is a lean game, meaning that it targets a small number of learning objectives efficiently so that development resources can be conserved to allow the game to be iteratively refined through more cycles of development and feedback than a larger game could sustain. Filament developed this game through the AGILE process, in which each development cycle aims to produce a complete feature or set of features that can be evaluated. This game is part of a series of lean games targeting STEM standards that Filament developed in consultation with teachers during each development cycle.

Backyard Engineers Demo Video and Launch Page

A video demo of *Backyard Engineers* is available on the Filament Games website:
https://www.filamentgames.com/fws2/products/backyard-engineer

References

National Governors Association Center for Best Practices, Council of Chief State School Officers (2010). *Common Core State Standards.* Washington, DC: National Governors Association Center for Best Practices, Council of Chief State School Officers

NGSS Lead States (2013). *Next Generation Science Standards: For States, By States.* Washington, DC: The National Academies Press.

Acknowledgments