**Project Triumph**

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# Table of Contents

[Table of Contents](#_w6tltitkroxf)

1. [Game Overview](#_b1zghxqkrdaf)
   1. [Target Learning Objective (LO)](#_z5ktqn5ud51k)
   2. [Demographics - Target Audience](#_3yxrcs6fft7v)
   3. [Genre / Theme / Setting](#_nlv81sxv1tad)
   4. [Core Gameplay Summary](#_6i3cn420ishz)
   5. [Look and Feel](#_7wdt5h23tvzo)
   6. [Target Platform(s)](#_z6u0mxcbjqkh)
2. [Game Flow](#_gpxmptz7kx5l)
   1. [Part 1 - [Name of this Portion of the Game]](#_vzqju6qz195s)
      1. [L.O. Concept(s) Covered](#_7rj3x13wsu21)
      2. [Summary](#_w93n9hjgibra)
      3. [Mechanics](#_nh90sk5jeis7)
      4. [Losing Gameplay / Incorrect Concept Understanding](#_qgyue44qr7pc)
      5. [Mockups](#_t28n5k8jjlvp)
   2. [Part 2 - [Name of this Portion of the Game]](#_hcjn0t11npa8)
      1. [L.O. Concept(s) Covered](#_q73prq6q08uj)
      2. [Summary](#_sfw8yv2xgnrn)
      3. [Mechanics](#_2c8dov7re2rs)
      4. [Losing Gameplay / Incorrect Concept Understanding](#_135fy35r9e58)
      5. [Mockups](#_pqo6edtik4df)
   3. [Part 3 - [Name of this Portion of the Game]](#_7719zk617dur)
   4. [Etc.](#_4ijz0uo2nv0z)
3. [LO Concept Coverage](#_ksso39ws6f3w)
   1. [Academic Concepts](#_jub7y4l2tdxk)
4. [Legends of Learning Required Content Practices](#_htsps0f46zva)
   1. [Checklist Overview](#_f51r4b8ioo7a)
   2. [Connection Between Gameplay and Learning](#_8j8qo2nti00o)
   3. [Role of Text in Learning](#_woe6ankxv3c1)
   4. [Characters - Diversity](#_lt79bqy4gldx)
5. [Technical](#_oftwb572cwpn)
   1. [Development Hardware/Software](#_ileqj0wqbx92)
   2. [Music and Sounds](#_7xcl4emkqa1o)
   3. [Asset Summary](#_b34pcjhox752)
6. [Art Style](#_uicrcm7meylh)
   1. [Mockups](#_9defhc2f3dbt)
7. [Schedule for Development + Delivery](#_5aez51ch4gc0)
8. [[OPTIONAL] Story / Narrative](#_3s5s7z0qgif)
   1. [Back Story](#_2cxaegn1vq3j)
   2. [Plot Elements](#_d2mj3wwpm8)

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# Game Overview

### Target Learning Objective (LO)

* [4-PS3.A-2: Forms of Energy Movement](https://drive.google.com/file/d/1maKdtaHiZjOe2KlV4SXdg3tUdEZfIr1l)

### Demographics - Target Audience

* Ages 8-11 (Grade School)

### Genre / Theme / Setting

* Puzzle Game – Players must place the correct elements into its proper chamber, while also manipulating the contraption to allow energy to flow. Think in terms of rubrics cube, turning gears, and pipes.
* Energy Spirits and Mechanical Artifacts – The game will have a fairy-tale aesthetics, but still show real world physical effects.
* Fantastical Landscape – The world in the game appears bleak and colorless at first, but is then filled with colors and brightness as the player solves the mechanical artifact.

### Core Gameplay Summary

The game consists of three parts: Visual/Interactive Lesson, Mechanical Puzzle, Victory Marching Band. Most of the game happens during the mechanical puzzle. Whenever there’s a new type of energy introduced, the visual/interactive lesson takes place before the puzzle. The victory phase will occur once the puzzle is solved, where the marching band grows in numbers as the game progress.

#### Visual/Interactive Lesson

The game will explain one or more energies, and how they interact in the environment. The player is then presented with a simple mechanical artifact to interact and place an energy to verify the explanations.

#### Mechanical Puzzle

The goal of the puzzle is to fully power up the mechanical artifact such that it emits sounds to form a melody. The player places different energy in their respective chamber. Along with placing the energies, the player must manipulate the mechanical parts such that the energies can power up the entire artifact.

In order to make the game more interesting, the way the player interacts with the artifact will vary based on how they are visualized. i.e., interacting with the mechanisms feel like you are actually manipulating it, rather than through an abstract UI.

The learning in the game happens when the player understands the interaction between energies as they are placed into the artifact. The player will understand how energies move, interact, and generate power, as they solve the puzzle correctly.

#### Victory Marching Band

Once the mechanical artifact is fully powered, it will descend into the land where it will arouse the creatures into action. These creatures will band together to follow the artifact, playing a tune along. This part of the game is simply a visual victory for the players to enjoy before they move on to the next lesson/puzzle.

### Look and Feel

* Energy Spirits – In order to draw in players to learn about the types of energies, each energy is represented as a spirit with its own quirky personality.
* Mechanical Artifacts – The style will be that of Dr. Seuss/Moebius with all the gears and pipes. Much like the sketches found in the early 1600-1700’s, but more fantastical. They will also have a certain organic feel to them so that they do not appear too “boxy”.
* Landscape – Much like that of fairy tales in two contrasts: ominous and colorful. Shifting from ominous to colorful when the player achieves victory.

### Target Platform(s)

* WebGL with iPad support – Since the game is completely mouse driven, there should be no issue with playing the game in any platform that supports mouse or touch input.

# Game Flow

## Part 1 – Light Energy

### L.O. Concept(s) Covered

* Potential energy.
* Light transmits energy through electromagnetic waves.
* Transfer of energy from one form to another.

### Summary

This part of the game simply introduces the player to the concept of energy: from source (light), movement (light transmission), transform to another source (chemical to mechanical). The simple puzzle will also act as a tutorial for how to play the rest of the game.

* The scene will start in a dimly lit background with a creature asleep.
* A dialog pops up to discuss energy, and the potential of energy.
* A simple mechanical artifact is shown with only one chamber for the energy. Only one light energy can be used.
* The tutorial for the gameplay is displayed for: moving the light energy to the chamber, rotating the discs of the mechanical artifact to allow light to transmit outwardly.
* Once the mechanical artifact is solved, more dialog is shown about how energy is moved from one source to another (in this case, light).
* Creature is awakened, background is lit up, creature proceeds to march forward. The game will move on to the next part.

### Mechanics

* The game will entirely be controlled by mouse (or touch screen)
* The player is tasked to place the light spirit into the chamber. The tutorial will help guide the player on how to place spirits into a chamber. The game will proceed once this is completed.
* The artifact will now activate to allow the player to rotate two discs that have a part of it opened to allow the light to flood through. The game will guide the player on how to rotate the discs. The objective is to rotate the discs such that their opening allows the light to flood outside.
* Once the light energy is placed into the chamber, and the said light is able to pass outside the artifact; the game will proceed.

### Losing Gameplay / Incorrect Concept Understanding

* There is no lose condition for this game. However, the player must power the artifact in order to proceed.
* Since this part of the game is a tutorial, the game will be guiding the player throughout the process.

### Mockups

(TODO)

## Part 2 –Physical, Sound Energy

### L.O. Concept(s) Covered

* Motion is the change in position of an object.
* Moving objects contain energy.
* The energy transmitted by mechanical processes, light, sound, and electrical current can be used in many common applications.
* Sound transmits energy through vibrations in materials.

### Summary

The game will have another explanation here about kinetic energy, as well as sound through vibration made from physical contact. Dialogs to explain these phenomena will activate as the player progresses through this part.

* Introduction of physical object that exert kinetic energy (gravity, other moving objects)
* The main goal of the game is explained here where the player must power up the artifact to produce a series of sounds. In this case, a sort of percussion.
* Once the artifact is fully powered, it will descend into the land to awaken more creatures to follow the first one from the previous part. These creatures will play an instrument that follows the rhythm of the artifact, akin to a marching band.

### Mechanics

* Placeable spirits: gears.
* Levers to change direction of rotating slots for gears.

### Mockups

(TODO)

## Part 3 – Light, Physical, Sound Energy

### L.O. Concept(s) Covered

* Energy can be moved from place to place by light.
* Energy can be moved from place to place by sound.

### Summary

The game will explain how light energy can be moved from one place to another via reflectors. The way sound energy can flow from one place to another is also explained here.

* Introduction of reflector to direct light energy.
* Explanation of how sound can move through vibrations.
* Just like from the previous part, the artifact will descend into the land to awaken more creatures. These will add more melody to the marching band.

### Mechanics

* Placeable spirits: light, gears.
* Rotatable reflectors.
* Levers to change gear directions.
* Rotation of segments to arrange materials that allow sound to flow.

### Mockups

(TODO)

## Part 4 – Water, Physical, and Electric Energy

### L.O. Concept(s) Covered

* The energy of motion is a kind of mechanical energy.
* Electrical current transmits energy through moving electric charges.

### Summary

This part will further demonstrate kinetic energy with the water element. This will also show how energy can be stored through electrical charges generated from kinetic energy, and transferred via wires. This electrical energy can then power up another object to exert another form of energy (kinetic in this case).

### Mechanics

* Placeable spirits: water, gears.
* Rotation of tubes, wire plates, and chambers.

### Mockups

(TODO)

## Part 5 – Heat (Fire/Steam), Water Energy

### L.O. Concept(s) Covered

### Summary

### Mechanics

### Mockups

## Part 6 – Heat (Fire/Steam), Physical (Water), Electric Energy

### L.O. Concept(s) Covered

### Summary

### Mechanics

### Mockups

## Part 7 –Wind Energy

### L.O. Concept(s) Covered

### Summary

### Mechanics

### Mockups

## Part 8 – Heat, Water, Wind Energy

### L.O. Concept(s) Covered

### Summary

### Mechanics

### Mockups

# LO Concept Coverage

### Academic Concepts

|  |  |
| --- | --- |
| **Concept** | **weight** |
| Electrical current transmits energy through moving electric charges. | Core |
| Motion is the change in position of an object. | Peripheral |
| Energy can be moved from place to place by sound. | Core |
| Sound transmits energy through vibrations in materials. | Core |
| Light transmits energy through electromagnetic waves. | Core |
| Energy can be moved from place to place by light. | Core |
| Energy can be moved from place to place by electric currents. | Core |
| Energy can be moved from place to place by moving objects. | Core |
| The energy transmitted by mechanical processes, light, sound, and electrical current can be used in many common applications. | Core |
| Moving objects contain energy. | Peripheral |
| The energy of motion is a kind of mechanical energy. | Peripheral |
| Waves transmit energy from one location to another, but they do not transmit matter. | Peripheral |
| The energy of motion is called kinetic energy. | Peripheral |

# Legends of Learning Required Content Practices

### Checklist Overview

[Google Doc Reference](https://docs.google.com/document/d/10yED8ZwFXOWjwvroqZxaHn1A6utMDncaFwmyc8dqc-g/edit?usp=sharing)

|  |  |
| --- | --- |
| **ITEM** | **COVERED** |
| Players should learn and be held accountable through gameplay-based problem solving and experience. Players should not be learning primarily through text-based instruction or assessment items. |  |
| Game does not include multiple choice assessment items. |  |
| All instruction is scientifically and mathematically correct. |  |
| Confirm that the game is linked to 2/3 or 5 main concepts of the total, whichever is greater. Confirm that the linked main concepts are correctly covered in the game. |  |
| All on-screen words spelled correctly and grammatically correct. |  |
| Vocabulary and reading level appropriate for the lowest grade level within the target audience and grade band. |  |
| Game does not include material that is inappropriate for school. This includes, but is not limited to: violence, firearms, bombs, knives, daggers, blood, gore, smoking, vaping, drug use, any mind-altering substances, alcohol, harm to human-looking characters, harm to animals, insinuating killing or death, ideally they’re always chased away rather than eliminated. If there is conflict with an enemy in game, they are chased away rather than eliminated or killed. (There can be death if it is in the context of the learning objective – ex. The food chain) If you have any questions about this policy and your game, please ask us. |  |
| Game avoids any stereotypic presentation of gender, race, region, or culture. |  |
| Characters are diverse in gender, race, culture, and ability. |  |
| Players cannot simply click through and complete the game without learning. Players should be prompted to re-learn and re-do portions of the game where they had poor results due to less understanding of the academic material. Avoid the word “FAIL” if the student incorrectly understands academic material. |  |
| Academic problems are not consistently repeated. Players are presented with different problems to solve. |  |
| Gameplay mechanic reinforces the academic material, rather than being completely separate from instruction. I.e, there is a focus on academic reasoning rather than concept / question repetition. |  |
| Gameplay is intuitive and a player in the target age range can navigate the game and beat it with enough effort. |  |
| Games should be fun and interesting, designed as non-educational games are designed, with design to encourage players to keep playing. |  |
| Game is between 5 and 25 minutes in duration. |  |
| All text must be large, clear and concise with font sizes that can be read on a small Chromebook screen. |  |

### Connection Between Gameplay and Learning

* The player will be powering artifacts using various types of energy. The way these energies interact within the artifact will help players learn about them, and how they are interchangeable.
* Various puzzles in the game revolves around lining up pathways to transfer energy across the artifact. Players will understand how energy is transferred by various means as they are presented.

### Role of Text in Learning

* Texts will be used to introduce the player to the world, as well as instructions.
* Each of the lesson will be accompanied with a brief scientific explanation of the energy and their functionality.
* To alleviate the use of texts, most of it will be in a form of a dialog speaking directly to the player. This allows for better engagement when learning the subject.

### Characters - Diversity

* Spirits – each spirit represents a form of energy. Their personality describes the volatility and behavior corelates to this.
* Creatures – they resemble rams and ewes. They appear lost and forlorn until they hear the music, shaping each of them to their own personality.
* The ever-reassuring robot will be there to help teach the player about the various types of energies, and how they are applied in the world.

(TODO: mock ups)

# Technical

### Development Hardware/Software

* All development will be done in Windows 10.
* iPad 6 for tablet testing.
* Browsers: Firefox, Edge, Chrome, and Safari (via iPad 6)
* Game Engine: Unity 2022.3+

### Asset Summary

* Simple bullet point list
* Differentiate if WebGL only, mobile only, or both
* You may link to an exterior spreadsheet if it is easier to categorize / show in that format.

### Music and Sounds

* Music
  + A rhythmic beat plays when artifacts are completed.
  + Each rhythm is added to the victory marching band as more creatures join the march. The instruments played by the band will match these beats.
  + A soft ambient hymn is played in the background during the mechanical artifact.
* Sound
  + Common UI sounds for buttons.
  + Mechanical sounds for various parts of the artifacts.
  + Sounds for picking and dropping spirits.
  + Sounds when connectors are flooded by energy.

# Art Style

### Mechanical Artifact

### Spirits

### Creatures

# Schedule for Development + Delivery

* You may link to another document / spreadsheet if you like
  + If you do, just make sure viewing permissions are available :)

# Story / Narrative

### Back Story

* If you would like to share this, present in any format you like

### Plot Elements

* If you would like to share this, present in any format you like