

# SIC Materials Development- Project Scope:Therapeutic Toy Design Challenge

## Student Work Example:

### Therapeutic Toy Design Challenge

**Client:** Boston Children's Hospital and Mass STEM Hub

**Target Consumer:** Children with Spastic Hemiplegia Cerebral Palsy

**Ages:** 8 years old and up

**Designer(s):** Khanh, Sarah, Saraiya, and Jaida

**Team Name:** Katastrophe

**Problem Statement:** Design a Therapeutic toy for kids with Cerebral Palsy.

**Design Statement:** Design a Harp/Crossbow for kids with Spastic Hemiplegia Cerebral Palsy that helps the patient develop muscle strength and coordination in their arms. With the design of the harp, the patient will learn how to coordinate their fingers to play different notes at different volumes and tones and while learning how to play songs. As they use the crossbow, they will use their arm strength to coordinate the arrows and shoot at multiple bullseyes to earn points during multiple modes of educational games.

**Criteria/Constraints:** Toy has to be universal for all children, their movement is limited, you need to bring in your own materials, and the design also has to be creative and fun.

**Deliverables:** Working model, toy, sketch, notebook, poster, and designers.

### Student Notes and Toy Instructions:

#### HARPARROO

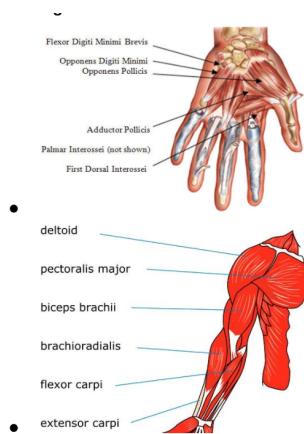
##### Materials:

Rubber Bands/Nylon (Strings)  
Cardboard/Wood (Structure)  
Velcro Strap (Arm Strap)  
Ribbons (Bow Placeholder)  
Wooden Rods (String Placeholder)  
Tape (Holds Bow Together)  
Pouch (Quiver)  
Foam sponges (Safety Tips)  
Paper holder (Attachment)  
Skewers (Arrows)  
Construction Paper (Instructions/Challenges)  
Hot Glue (Keeps Rods Stationary)  
Timer  
Thumbtacks

**Client:** Boston children hospital

**Design Statement:** Create a therapeutic toy for kids with cerebral palsy

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**Purpose:** The purpose of my therapeutic toy is to develop muscle movement, muscle memory, and hand-eye coordination. As the patient uses the toy, the muscles in their arms will develop and they will learn how to use and move their arms and fingers.

**Function 1:** The toy will be strapped on to the kid's arm and the kid will use the other arm to pull strings and play notes. That will help exercise their finger muscles. They can alternate which arm to strap it on to so both arms can get the develop muscles. They will be allowed learn how to play different songs and create their own songs, which then they will develop muscle memory on how to play those songs.

**Function 2:** By removing the most of the strings, you could also use it as a bow n' arrow or a crossbow. The arrows have a foam tip at the end so that will be no one gets hurt if one is shot at them. This part of the toy will help the patient with muscle movement and hand-eye coordination. The rubber will interchangeable for different levels of difficulties of pulling back the string and making the arrow go a certain distance. This will help will strengthen the muscles in the arm. On the target board, there will be letters and symbols of for the patient to spell out words and solve math equations and that will all depend on how well the patients hit the intended targets.

**Importance:** If there's one body that we rely on a lot in our everyday lives, it would be our arms. It would virtually be impossible for us to do the things that we do everyday if we lost our abilities to use them. For the patients who have cerebral palsy located in their arms and hands, this will help them work on their muscles. They will be able to learn how to use their arms more efficiently, build muscle, and improve their hand-eye coordination. Not only that, but they will also improve their listening skills and get educated in spelling and solving math equations.

### INNOVATIONS

Different modes of play: Time, Elimination, Normal, Quick Spell, Versus/Collaboration

**Time:** The patient will select a time limit of either 30, 60, or 90 seconds and they will try to spell out as many words or write and solve as many equations as they can. Scores will be determined at the end of the time limit.

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**Elimination:** You only get as many lives as the amount of arrows you have. You have the option to choose how many arrows to play with. If you miss, you won't be able to use that arrow again and you will be limited to use the arrows you have left. Each time you hit your intended target to spell a word or solve an equation, you are able to use that arrow again and you move on to the next card. The game ends when you have no more arrows to use. If you ended in the middle of spelling a word, that will not be counted to your final score.

**Normal:** Try to get to rack up as many points as u can by aiming near or at the bullseye. The shorter the distance your arrow hit from the bullseye, the greater the point value.

**Quick Spell:** You will be given one word to spell and you have to try to spell that word as fast as you can

**Versus/Collaboration:** You and your opponent/partner will each take a turn at using the toy. Both of you will choose a game mode and will either compete for the higher score or work together as a team to defeat another team

### Safety/Improvements/Building Instructions/Procedure

- Replace thumb tacks with wooden rods for safety
- Secure wooden rods with hot glue or some form of a strong sticky liquid or just use tape
- Use nylon string instead of rubber bands when using the harp aspect of the toy.
- Cut the string and attach each end together
- Get a wider velcro strap  
Get a wider velcro strap More efficient with wood as body
- Order of rubber bands from top to bottom: Yellow, Blue, Blue, Green, Orange
- Levels of difficulties for archery from easy to hard: Red, Orange, Yellow, Green, Blue
- Shorten the length of the arrows
- You can also adjust how far up or back you want the bowstring to be for different levels of difficulties

### Quiver Instructions:

- In the quiver, have it have separate sections for arrows, rubber bands, and nylon strings
- Use string to attach quiver on the waist or over the shoulder or keep paper holder
- Make quiver smaller
- Use strings and thumbtacks/magnets to place target boards on the poster board (fabric covered poster) for presentation and actual wall if manufactured
- Attach velcro to each arrow and velcro on every letter and number on target boards (or just bullseyes.
- Either make it one color or more colorful by painting it or covering it in fabric
- Create index cards with different songs on them so the patient knows how to play that song and what to play

**Play the note:** Each card will give a user a note to play at a specific volume and pitch and they will have to play it. This can be played with more than one person. The game ends when you go through all the cards or 30 seconds is up.

**Passing improve:** Two or more players can play. The starting person will play 3 notes and pass it onto the next person. That next person will then have to play what the person played before them and add an addition of their own notes. The 3 notes they play can't be exactly the same than the patterns of notes before it. The game ends when there is one person left in the game.

They can practice and warm up by going through the scale

Advanced: Use more than 1 arrow at a time

### Design Matrix

**Therapeutic Toy Matrix**

	Toy Name	Is it Buildable ?	Creativity	Sketch	Budget	Aesthetic	Total
	Khanh	3	4	4	3	3	19
	Timothy	2	2	0	3	2	12
	Sarah	3	4	2	3	2	17
	Saraiya	3	4	3	3	4	19

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## Student CAD Sketch

