Project 1 Brief
Climbing Equipment for Disabled Children
“Rock n’ Slide”

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The proposed design is an evolutionary innovation. Therefore existing equipment will be modified in order for physically impaired children to have the same playground experience as those children whom are not physically impaired. The pieces of existing equipment to be modified include, small-scale rock walls, platform, and a slide. Our goal is to modify existing playground climbing equipment so that children in wheelchairs, visually impaired children, and hearing impaired children can easily use it. In order to achieve this goal, we will focus on height requirements of the structure, the material of the ground, and the type of handgrips. Most importantly we will utilize top rope techniques (NCHPAD) to insure the safety of physically impaired children as they are climbing. Top rope techniques are commonly used in professional rock climbing.

The problem to be resolved is a playground structure accommodating children with disabilities to be used with minimal assistance. The structure that we will be focusing on is climbing equipment. It is important for children with disabilities to have equal opportunities to exercise and play in a social environment just as kids without disabilities are able to. According to the raising children network (RaisingChildren.net) the more interactions that physically disabled children have with physically able children, the more support from their peers they will have, therefore developing friendships, the more skills and talent they will develop, the more confidence they will have and a more sense of belonging they will have.

This is not a new problem; however there has been little effort to include disabled children in playground activity. There are disabled children all over the world and not many playgrounds for them to play on. PG news (Old.PostGazette.com) published an article that claimed “accessible” playgrounds really were not that accessible for physically disabled children, especially those in wheelchairs. This is an indication that this is an area where design needs to be improved.

The specific disabilities that we are targeting include children who have limited lower body function, visually impaired children, and hearing impaired children. The minimum age recommended for use is 6 and maximum age of 12. The minimum age of 6 is related to development of basic motor skills, thus enabling an enjoyable experience on a climbing structure. The maximum age of 12 is imposed because the playground is focused on pre adolescent social play and exercise. The minimum height for the structure will be 40 inches because this is the average height of most 6-year-old children. A maximum height is not applicable for this design. The minimum weight will be 44 pounds; once again this is the average weight of a 6-year-old child. A maximum weight will only be applicable for use of a harness. The maximum weight will be 120 pounds. The reason for the heavy maximum weight is because it may be the case that a physically disabled child has struggled with obesity due to the lack of exercise options available to them. Therefore it seems only fit to give these children the opportunity to change their exercise habits in a way that they find fun.
In order for the project to be a success we need to collect data such as child input on various structures of the playground. This data can be collected through Internet research and personal interviews. We will also need to research what modifications are already available for physically disabled children so that we can then use what is currently available where appropriate. This information can be collected through competing manufacturers’ publications.

The first prototype is a rock wall that is more horizontal to the ground than vertical. This was to allow a shorter falling distance and prevent falling in general. The grips on the rock wall were the appropriate size for safety and the ground was made of a foam substance. The point of this prototype was to allow children who cannot walk or whom are missing a limb to climb easier. The reason why did not chose this was because it did not seem entertaining enough for children. The factors taken from this design include the rough surface and the grips of the rocks and the intended audience.

After analyzing the first prototype and researching various climbing equipment online, we tried incorporating more diverse equipment to the piece. The second prototype includes multiple ways of climbing to reach the same surface. They include a rock wall and ladder that becomes increasingly more parallel to the ground. At the platform at the top of the structure there is a handrail for safety. There is a slide as a means to get back down. The ground on this design is also a foam substance. The factors that were adopted from this design are the handrails and the inclusion of multiple ways to climb a structure.

After analyzing the first and second prototypes as a team we decided to make the structure look more aesthetically pleasing to children. This structure compares to a castle that encourages imaginary play. Along with the appearance it includes equipment ranging from rock walls, ladders, bridges, and rope swings.
This section of the data analysis explains the needs and metrics presented on the house of quality found on the last page. Through research and trial and error we have determined the needs that will have to be accessed in the designing and building of the climbing structure. Needs include fun which can be measured in the number of children that play on the structure in a given an hour. The structure needs to be accessible especially because children in wheelchairs are expected to play on it. This means that there must be a clear pathway to the structure and ground that allows commuting to and from the structure to be done with ease. Safety must comply with the Public Playground Safety Handbook, however it can be experimentally measured by observing the number of injuries that children obtain while using the structure. Climbing Difficulty was determined to be a need because it was found that the difficulty should not be too difficult, however if the structure was too easy to climb children would not be entertained yielding less children using the structure. The structure itself must have a perception of robustness; its appearance must assure children that it is safe to play on. This can be measure by recording the number of repeat users and analyzing the material used. Based on analysis of other playgrounds for disabled children, it is estimated that our rankings lie in the middle. The Kids Connection Playground was able to focus on a wider range of disabilities, thus they were ranked higher in fun and access. Shaw Park’s tree top playground was very limited to the amount of disabled children that could use their equipment. The only climbing structure was a ramp that would not present enough entertainment, therefore was generally ranked lower. The competition ranking can be explained in further detail by referring to the house of quality on the last page.

We understand that it is a great challenge for children with disabilities to play on any kind of playground. However, for them to climb a structure presents challenges of its own. Therefore we decided that it is best to modify existing equipment in order for physically disabled children to use it. These modifications include the Top Rope Techniques (NCHPAD). Also rungs, handrails, climbing bars, or other hand support should have a diameter or cross section between .95 and 1.55 inches, this is according to the public playground safety handbook, published by the consumer products safety commission. We should also be sure that the handrails are secure and will not turn. The ground will be made of foam similar to HD36 high quality with a thin rebound shell. This type of surface is stiff enough to both walk and fall on according to the foam factory. Since this surface is stiff enough to walk on, it can be assumed that a wheelchair will also be easy to maneuver on it. The height of the overall structure will be 5 meters this is in appliance with the consumer products safety commission.

The lot that the structure will be built on currently has a hill with an increasing slop, thus funds will be used to level the ground before construction.

The equipment we are proposing does indeed meet the requirements in the proposal, procedures, and data analysis. Our equipment overall is meant for children without use of their legs, children missing a limb, children who are visually impaired, and hearing impaired. In order to meet these disabilities, we plan to include the Top Rope
Techniques including a modified technique based on the Para pull up (NCHPAD), amputee adaption, visually impaired, and hearing impaired adaption to the equipment. To insure safety, we will also focus on the height of the structure, which will be equal to 5 meters. The ground will be made of high quality foam cell, which cushions falls and is durable enough for wheelchairs to maneuver easily. Lastly, the grips will be an appropriate diameter and cross section so that children with the targeted age group can easily use them. In addition, the grips will be placed a maximum of approximately .33 meters from one and other and will have appropriate shapes in order to insure that children will be able to grasp them easily.

As for the small- scale rock wall there needs to be a slight overhang so that if a child were to fall they would not fall directly on the rocks themselves. We will use top rope techniques. The techniques that we will use are based off of a Para Pull Up (NCHPAD), which means the climber, is attached to a relay and an ascender, which is then attached to a chest harness. The modification we are making is in place of the chest harness there will be a seat to help children in wheelchairs climb. It will work like a rope and pulley system, the climber can pull themselves up, but if they were to slip there will be a lock so they will not hit the ground. The next technique focuses on someone with a single amputee. The key to single amputee is that they are able to use the same technique as a climber without an amputee, in other words they rely on their stronger limbs to climb. Therefore it is only fit to include a padded ground increase of a fall. Lastly, for the visually impaired and hearing impaired, there needs to be a way to understand the placement of the rocks. The most basic way to do this is to have a spotter present to guide them as they are climbing.

A slide will be present as a mean to descend for those children who are able. As for the children who are unable to be removed from the chair after climbing they will be able to descend using the pulley system.
Works Cited


