**Robotic Art Drawing Assist Questions**

1. What is the expected function of the device?
   1. To help create more independence in the art making process for students who have limited mobility in their hands and arms
   2. Helping to assist create an artwork for students who have limited mobilities
      1. Student has limited mobility in arms/hands -> currently an aid is working hand over hand to assist in drawing (trouble gripping)
         1. Wheelchairs, blind, issues with strength and grasping, joystick use, buttons are ok
      2. Maybe drawing on a tablet or drawing on paper
         1. Create on a tablet interface - wonderful :)
         2. Actual thing where they would grip onto crayons and it would move with them
            1. Joystick movement - would get that more, harder for the students to manage technology sometimes
            2. Real time drawing would be more manageable (enjoyable?)
         3. Physical tangible artwork
            1. Should device be able to adapt to different sizes of paper/screens?
      3. Extension off the arm
      4. Not someone else doing it for them
      5. **We want them to be able to be able to leave with a piece of artwork**
         1. Drawing, painting, chalk, crayons, pencils
2. Where would the device be used? (in the classroom, outside)
   1. In the classroom
      1. Moved into classrooms rather than stationary or home class
      2. Needs to be portable (art cart 3ftx2ft)
3. What types of medium would be used in the artwork?
   1. Ideally I would like it to be adaptable to multiple types of drawing mediums - pencil, markers, paintbrush, crayon, try to use a wide variety, bingo dabber
   2. Priority: marker, crayon, colored pencil, paint brushes, bingo dab (?)
   3. Up and down motion!!
   4. Several sizes paper, no bigger than 9x12, biggest desk will allow
4. How many size/color options would be needed?
   1. For colors I would love a simple color wheel - red, orange, yellow, green, blue, purple, white, black, brown
      1. Choosing their own color would be great (different buttons?) and they would enjoy that
      2. Different paint brushes - watercolor paint brushes are smaller, wider range of brushes, many sizes of tools
5. How many devices would be needed?
   1. One device that might be controlled in different ways - eye control, joystick or up, down, side to side buttons, to meet the mobility and intellectual ability of several students
   2. 3-4 students would benefit from device, three in same classroom, several students coming up into school soon. Need from all school levels.
   3. Don’t necessarily need three devices
6. What interfaces would work best for the user? (keyboard, tablet, eye gaze)
   1. All students have their own ipad so an eye gaze program or simple “paint program” with simple options could work, although it would have to be extremely simplified to meet the cognitive abilities of my students. A joystick and button option might be the best for simple control
7. Will this device need to be easily transportable?
   1. yes
8. Will the device need to set-up/taken down often?
   1. Possibly - could be flexible with this
   2. Yes, she doesn’t have a classroom. She pushes into other classroom
9. What might the general size and weight of the device be?
   1. 20x24
   2. Art cart is 3’x4’ they roll into the class
   3. Desks are larger than then normal student desk
      1. Karen will follow up with desk dimensions
      2. Don’t know how stable wheelchair desks are
      3. Wheelchairs do fit under/at desks

**More Specific Questions**

1. What are the students’ different ranges of motion and abilities?
   1. Hard to press buttons accurately on tablet for some of them
   2. Easier to do a joystick movement
   3. Tablet does give a wider range of options
   4. Don’t need them to grab the utensil
   5. Push a button, move a joystick
   6. Most of them have one-on-one aides
   7. Some of them are blind
   8. Probably don’t have spinning motion
   9. Pressing down on the joystick and pulling up likely possible.
2. How detailed/accurate should the art be?
   1. Not detailed orientation
   2. Different decorating task
      1. Collage cutting and layering
      2. Lines, shapes, cool and warm colors
      3. Not really drawing a picture
      4. Rolling paint
      5. Watercolors
3. Would the change is color need to be robotic as well or would there be a separate caregiver to change the tool?
   1. They can communicate colors and options to an aid
   2. Or need to automatically, pick up the color tool - students would not be able to accurately move the tool to a specific spot to pick up a tool

1. Would change in mediums in the same drawing be expected?
   1. Yes - many layers on the same drawing
2. How should the interface of the device be set up for use with wheelchair/seated students for best usage/viewing?
   1. See wheelchair question at the bottom
3. What would integration into a class look like?
4. Is the paper sliding around an issue while drawing?
   1. Need to clamp it probably
   2. Rotating the paper would be nice for limited range of motion
5. How long would the device be used at a time?
   1. 30 minutes twice a week
6. Should the output be reflected in real time or through a screen before printing on the medium of choice?
   1. Leaning more towards real time - instant gratification
   2. Don’t currently erase or undo what they drew, just happy to be making something (could be a communication issue; they can’t communicate they don’t like something so they don’t)
7. Are there any recommendations for standard x-y plotters?
   1. They would create an art work on a tablet and then the plotter would create them
   2. She doesn’t currently have an x-y plotter
8. Has anything been tried in the past and what were the issues with that?
   1. See current section below
   2. Adapting tools to help them grip better
      1. Tennis ball onto marker - smaller then tennis ball/pool noodles to widen the grip. Paint brushes that help with grip
      2. Hard to control motions
9. What is the most important feature of the device?
10. What makes a device wheelchair accessible?
    1. They can roll under the
    2. Attach controls to wheelchair, would not be able to reach on the table
    3. Device can probably be flat
    4. Karen will look into devices that attach onto the wheelchair
11. Is there a need to erase
    1. Probably not
    2. Don’t currently erase or undo what they drew, just happy to be making something (could be a communication issue; they can’t communicate they don’t like something so they don’t)
12. Anything tried before?
    1. Different grips, specially designed tools
    2. Previous tools do not help range of motion
13. 9x12 paper, 8x11 - mostly 9x12
14. Adding smiley face, heart… if we use a tablet interface
    1. Premade figures could let them make something they actually want to
15. Magnetic Mitten idea would help the grasping issue and would work with many different size/shape hands
16. How much independence
    1. Have their aid change the art method and maybe color
    2. She would need to communicate with the student and them understanding and selecting the art method - not sure that this would be successful

Current:

Most in wheelchairs, blind, struggle with grasping, aid puts hand around marker and then aid moves arm around artwork

Other students are fine with joystick

Key switches, remote controlled car can’t grab, doesn’t have range for a paper

Aid moves around paper

Lack of control to draw an image

Karen will record some of the students working in art class and send some pictures of the projects/art they make

Also send pictures of the desks/her cart