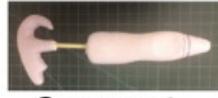


Assignment 6

Product Design 370
Selek, Hale
Group 14
Tracie Jackson, Jared Galloway Taro Unterburger

Concept Evaluation

							
	Concept 1	Concept 2	Concept 3		Concept 1	Concept 2	Concept 3
Aesthetics	D	++	++	Aesthetics	--	+-	D
Ergonomics	A	++	--	Ergonomics	++	++	A
Safety	T	+-	+-	Safety	+-	+-	T
Simplicity	U	--	--	Simplicity	++	++	U
Accuracy	M	++	++	Accuracy	--	--	M
Results		-3 +7	-5 +5	Results	-5 +5	-4 +6	

			
	Concept 1	Concept 2	Concept 3
Aesthetics	--	D	+-
Ergonomics	--	A	--
Safety	+-	T	+-
Simplicity	++	U	--
Accuracy	--	M	++
Results	-7 +3		-6 +4

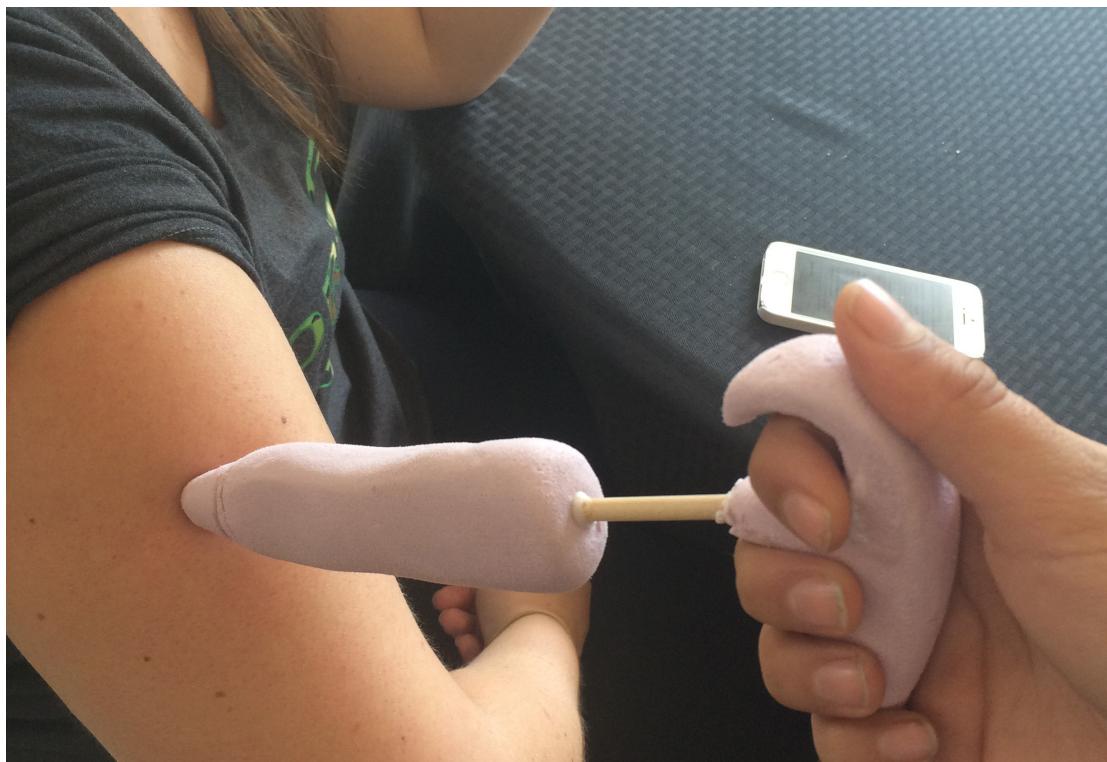


Criteria	Concept 1				Concept 2				Concept 3			
	-2	-1	1	2	-2	-1	1	2	-2	-1	1	2
Aesthetics			X				X				X	
Ergonomics		X							X		X	
Safety			X						X			X
Manufacturing		X					X			X		
Cost	X				X					X		
Simplicity			X				X				X	
Accuracy		X					X					X
Total												

Criteria	Weight	Concept 1	Concept 2	Concept 3
Aesthetics	5	6	4	5
Ergonomics	5	5	8	6
Safety	4	9	7	7
Manufacturing	1	3	7	5
Cost	2	4	5	4
Simplicity	1	9	4	9
Accuracy	4	9	5	8
Total		147	129	137



User Testing



Rachel has a fear of needles and hates seeing the needle every time she gets shots. After examining the syringe design Rachel said that the syringe looked less intimidating and liked the hidden needle. From her personal experience she gets anxiety from seeing the needle but with the casing around the needle makes it look friendly.

Rachel after examining the syringe said the design is simple enough to understand the purpose and it's function. There's no special buttons or compartments that require background knowledge to understand the function of the design. The only thing Rachel said she would think would help people like her who fear needles would be making the syringe smaller so it doesn't look scary.



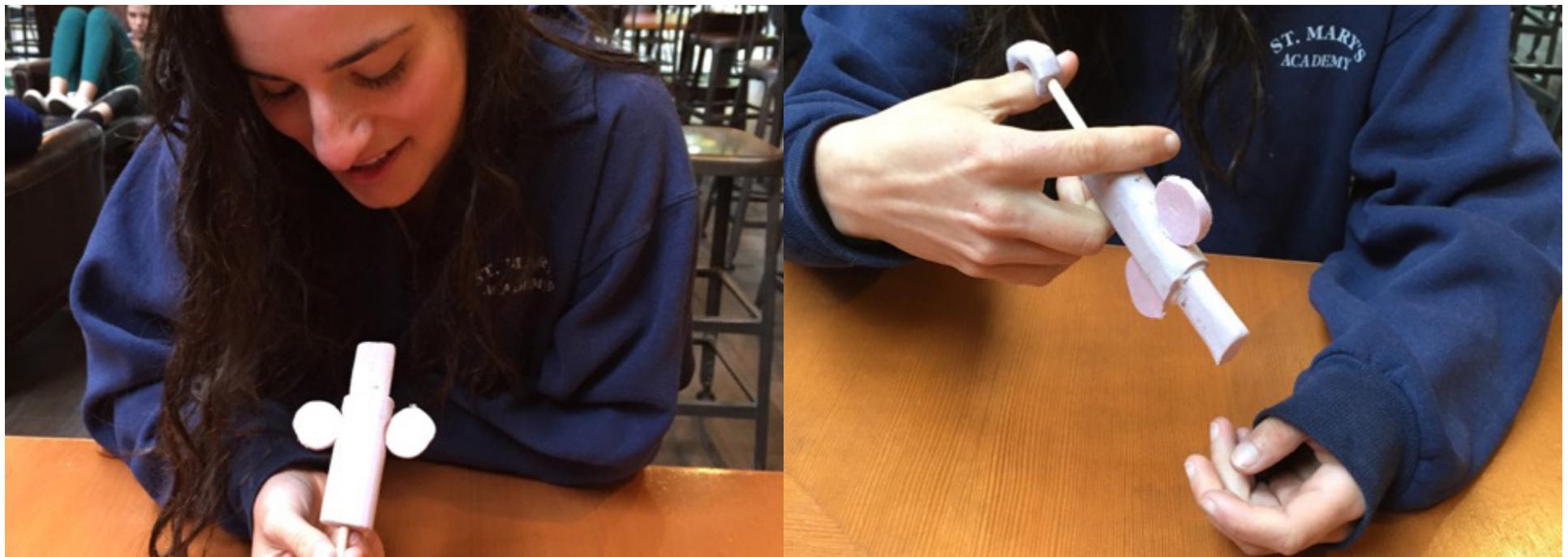
The needle is covered with a casing and the needle won't be released unless the Doctor or nurse presses the handle into the body. Covering the needle with a casing prevents accidental accidents by stabbing someone with the needle. The curve design makes the body of the syringe really safe.

The handle on the syringe fits the hand perfectly. It has a placement for thumb to rest and ridges for your fingers to grip onto. The only thing that could be changed is the handle being sized down so it isn't as intimidating and overpowering to the body of the syringe.



Accuracy: The syringe isn't as accurate because the casing of the syringe masks the needle, the design could use a laser pointer to make it more accurate and precise. You can control where the needle goes but it could use more work to make it super precise.

The design will cost more at first time purchase. With basic syringes it's easy to dispose of each part but with the added features of the new design it will cost more to manufacture. The syringe design is meant to be reusable and only dispose of the casing and needle but reuse the body. First time purchase will cost more than disposable syringes but you'll be able to purchase at a cheaper price the casing and needle in bulk.



Patient Aesthetics.

When observing the syringe, Rachel suggested that something this big might be a little scary to the patient. The retracting needle casing suggests a sort of bulk to the design that might scare the patient. However I explained that according to survey studies we conducted, people prefer not to look at the needle. This is due to the anxiety of looking at sharp pointed inducing muscle tensing and therefore, more pain. A possible solution? Slimming down the design while keeping the needle casing. A pro of the design was that it is more of an elliptical cylinder as opposed to a perfectly round shape. This elliptical design changes the universal focused shape to something more casual and pretty. This difference in shape may suggest to the patient that it is higher tech syringe, possibly even causing a placebo effect of (high tech/pretty -> less pain)

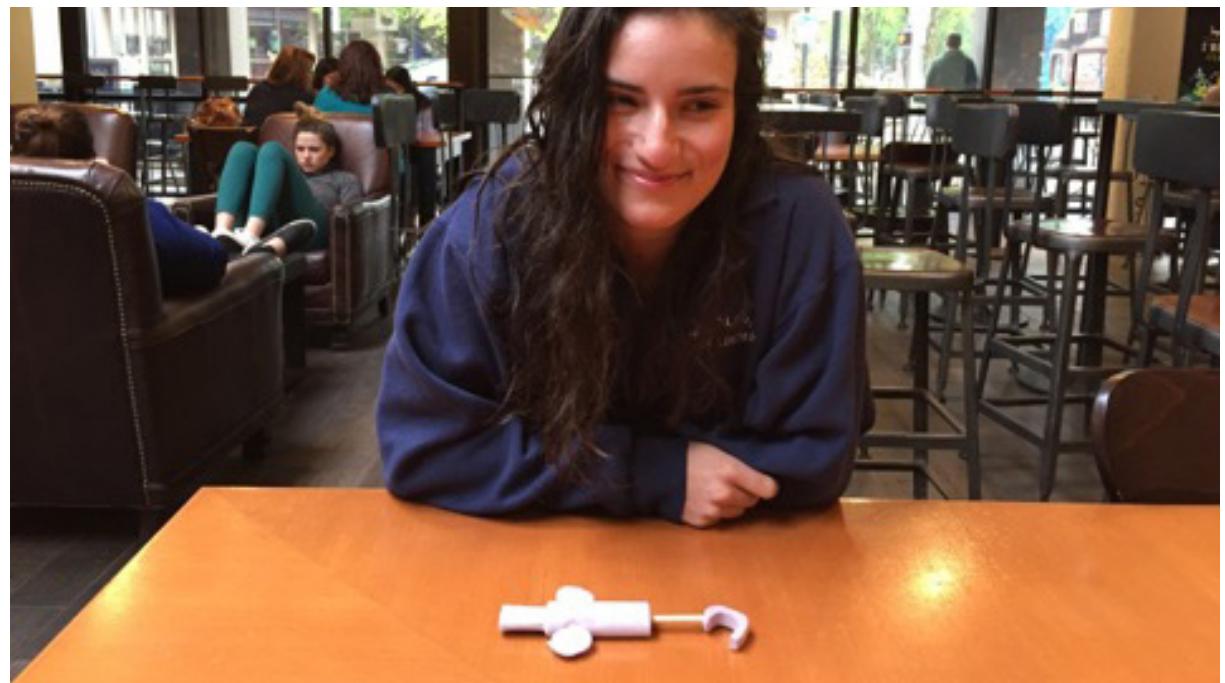
A major pro to this design was the ability to use one hand with ease and accuracy. Using one hand to secure the area of injection, the nurse can use his/her other hand to securely and accurately inject the needle with precision depth. Through the clear plastic casing, The user can then pull back the plunger to make sure they aren't hitting a vein (or are, in some cases) and then in the same movement push the medicine into the patient quickly and easily. One flaw with the design was that it was a little long, thus bringing us back to the suggestion to slim down the design.

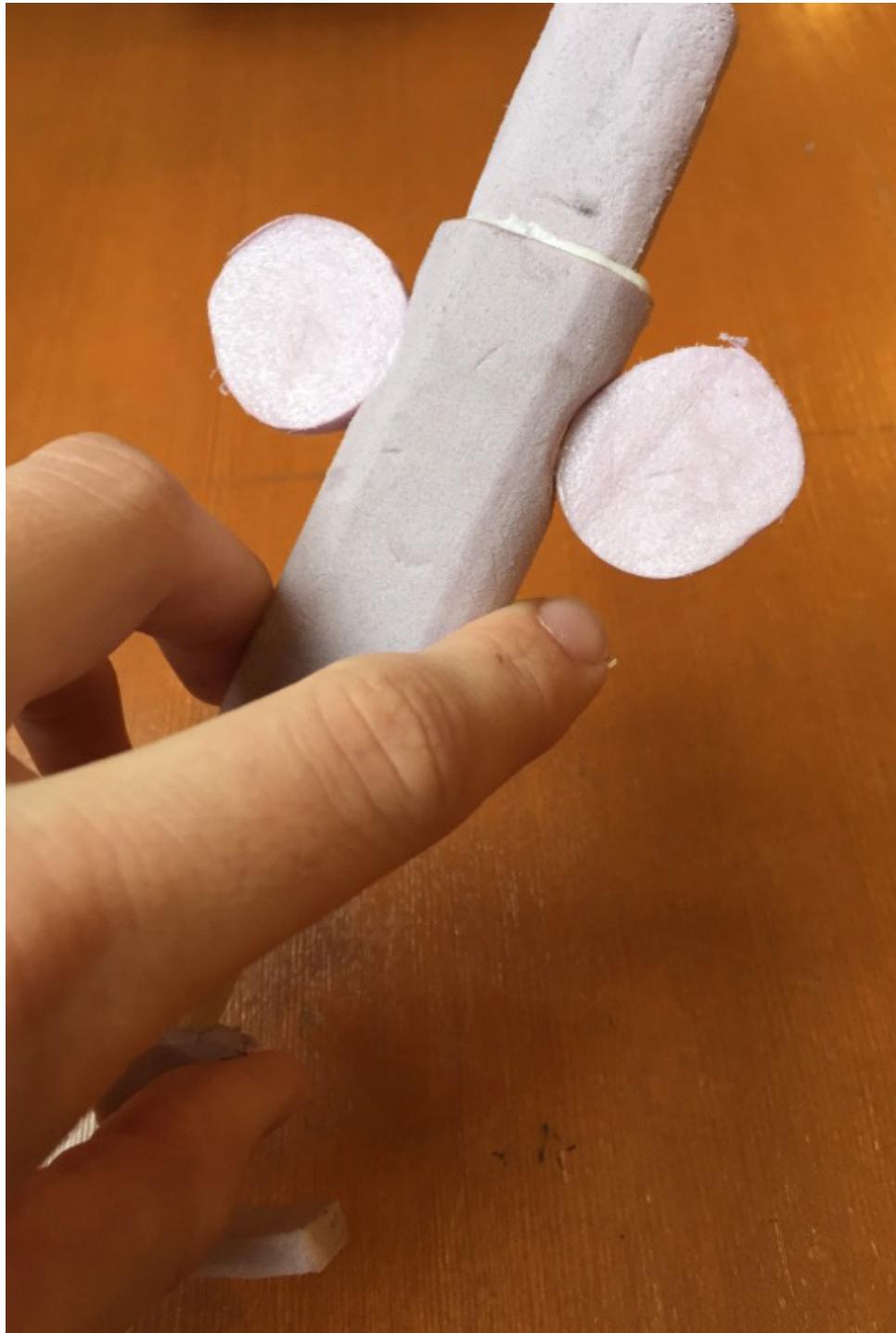


Accuracy.

When thinking about the accuracy of the design we were facing with the issue of the physician not being able to see the needle being injected. before, I believed this was just an issue if measuring depth of injection, So I created a small indication bar that would show exact depth. But as Rachel explained it; seeing the needle is important for keeping it straight while injecting in order to cause as little rupture to the flesh as possible. Faced a second time with a critique on the casing, I then realized that I could create a small window of clear plastic on the casing that reveals the needle to the user, providing accuracy, while the rest of the casing still shields the patient from seeing the sharp pointed object.

Rachel and I were in agreement that the danger of unintentionally pricking somebody is reduced with a casing around the needle. Although she said the probability of that was low anyway, given the usual setting of a hospital room. However, tons of biohazardous waste finds its way to landfills, especially in developing countries. This means that people who work at the landfill or find a living sorting through trash are at serious risk of getting pricked and infected. Because my design includes a lock on it, the needle will not be exposed throughout its lifetime waste cycle.





Rachel suggested syringes usually cost around \$7-8 dollars when the hospitals buy them in bulk and around \$12-15 for your average buyer. This is for the oldest designs which consist mainly of nothing but the basic needle, cap, syringe, and plunger. My design includes many more features such as the pre-set depth, depth indicator, needle casing, and casing lock. These will certainly add material, engineering, and more manufacturing steps. All suggesting that my design will be more expensive. I would assume that my design would be mainly used for kids at a young age that tend to be more prone to fear of needles. That way if the design was slowly implemented and accepted by a small part of the medical field, The manufacturing prices will drop in the long run and the design will become integrated into the medical community.



Rachel said the design was pretty intuitive besides the pre-set depth, which after a 20 second explanation became clear. The design fits the hand in an ergonomic way. It can be held over-hand or under-hand depending on user preference and site of injection. The design is certainly simple enough to be integrated into the community of medical professionals trained to use basic syringes as it follows the same basic principles of use.

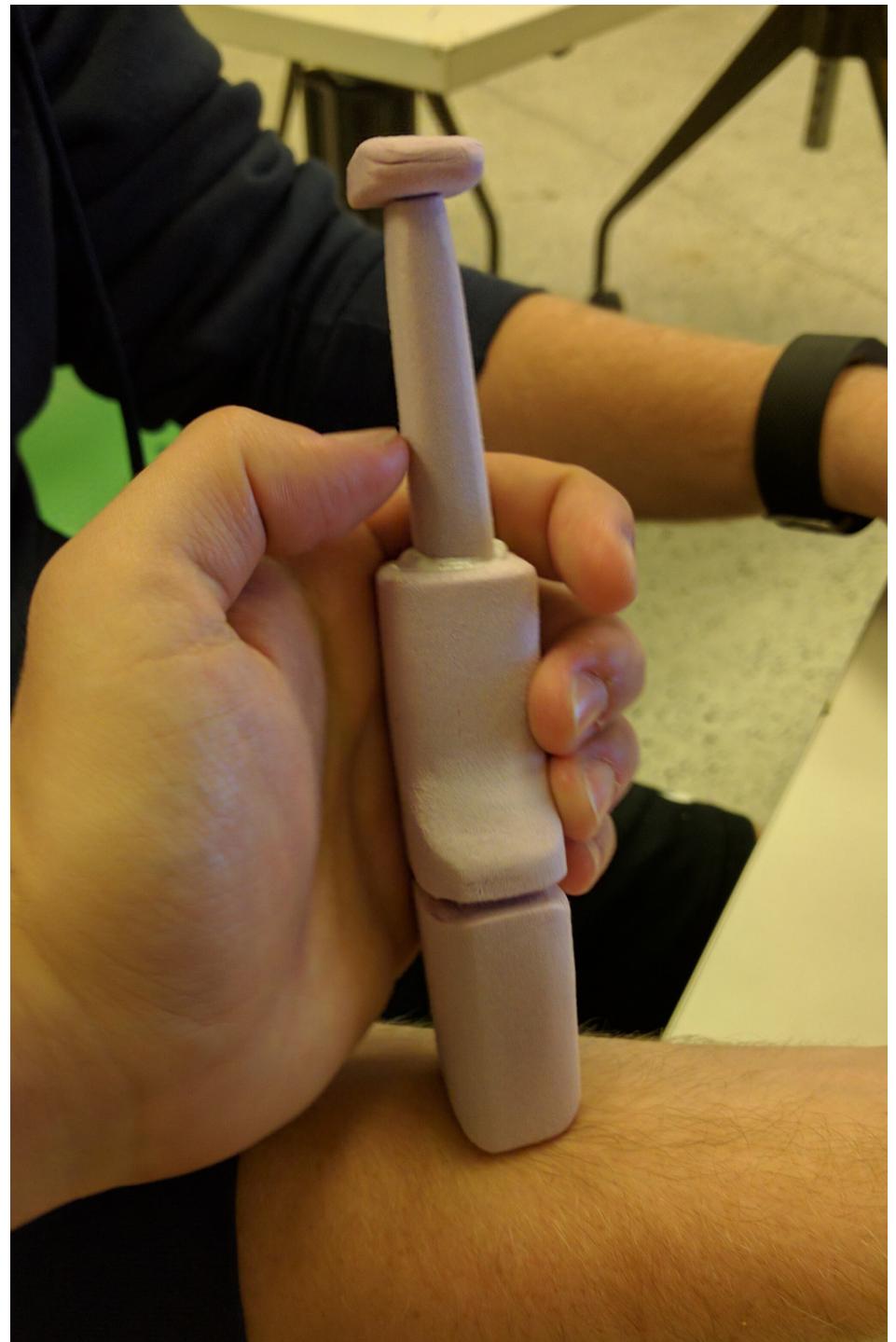


Upon first presentation of the foam model mockup, Grant suggested that perhaps the plunger design be altered so that it may be easier for the nurse to use. He also criticized the overall size and square shape of the piece, mentioning that it may be intimidating to patients, if they are well aware as to what the tool is.

Upon seeing the object, Grant digressed that the lack of a visible needle was a plus in avoiding the anxiety associated with vaccinations, however, the worry of aiming and missing the target was quite high. Due to the foam model's crudeness, the laser system cannot be integrated into this iteration of the model. After explaining to him how it would pinpoint the injection location, Grant proclaimed that this was a good solution to the problem that would be faced by this syringe design.

Again, the accuracy of the needle was questionable without the laser. Once the injection was made, the predetermined amount would be 100% injected into the patient. Paired with a large, contoured face, the needle is guaranteed to go in at around a 90° angle into the body.

Due to the needle being concealed, the possibility of contamination and accidental injection was greatly reduced. Peter liked the idea of prepackaged doses of vaccinations for specific body weights as well, as it leaves less room for more possible errors in the process. Overall, the precision of each individual step in the vaccination process with this design are the strong points in this piece.





With its basic plastic construction and reusable body, the syringe will have a lower cost overall than the disposable full syringes that are in use today. The most expensive part would be the body of the syringe, thanks to the laser system that will be integrated, but the battery pack will be user replaceable and last multiple hundreds of hours on a single charge. The lasers will last indefinitely. The idea is that although the initial cost may be somewhat high for some hospitals, the lower price of a cartridge system compared to a standard syringe (per unit) will lead to savings.

The design was stated as simple and elegant with a clear objective. Perhaps the main design was too simple, as it doesn't have enough hand support for even basic one handed use.

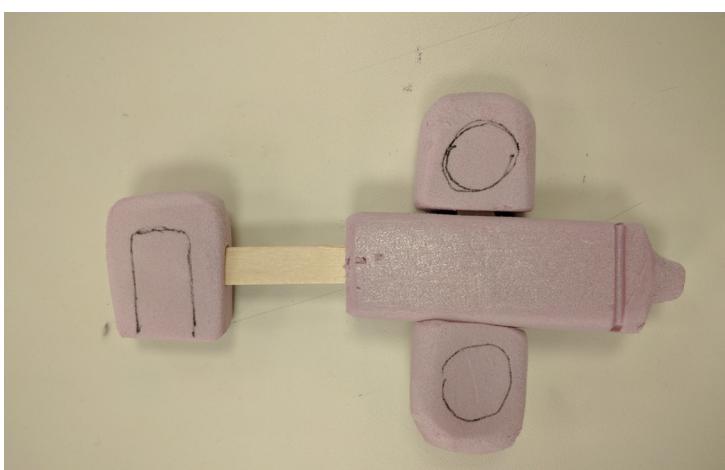
Concept Development Models



To sum up the critique given by rachel, I have come to the conclusion that my design had some flaws but was on the right track. It should be slimmed down slightly in order to make it sleeker and less painful looking. It also could use a small window on the casing to give the user a visual on the needle as it is injected to keep it strait. My design is similar enough to the standard syringe/needle that it can be integrated into the medical field, yet improved enough to hopefully provoke a better response from patients who do not handle needles well.



Overall there was positive feedback about the design and it accomplished the goal of being user friendly and less intimidating to the patients. The positive features were the needle was hidden, fit comfortably in users hand, and had a simple design that made it easy for anyone to use. The improvement would be a smaller handle, a laser pointer for accuracy and to make the size a more comfortable one for ergonomic grip.



The Accu-Guide still has some flaws in its construction and design that need to be addressed. The lack of ergonomic development and the rather complex design paired with high cost keep it less viable than it could potentially be. There is also an issue faced with the plunger design not being as versatile as before. The on the user end (for the nurse), a one-handed operation would be ideal, therefore the body must be adapted for easier operation. The issue of sterilization also arises, but with a Chlorine Dioxide sterilizing agent, it is possible to keep all of the electronics intact.

