

Tuler

A Geometric Kit for the Blind

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Introduction:

The gift of sight is a wonderful one. But 285 million people in this world are visually impaired and most products are not designed with them in mind. An insightful visit to the 'Devnar school for the Blind' lead us to work towards improving the educational aids in the fields of science and mathematics.



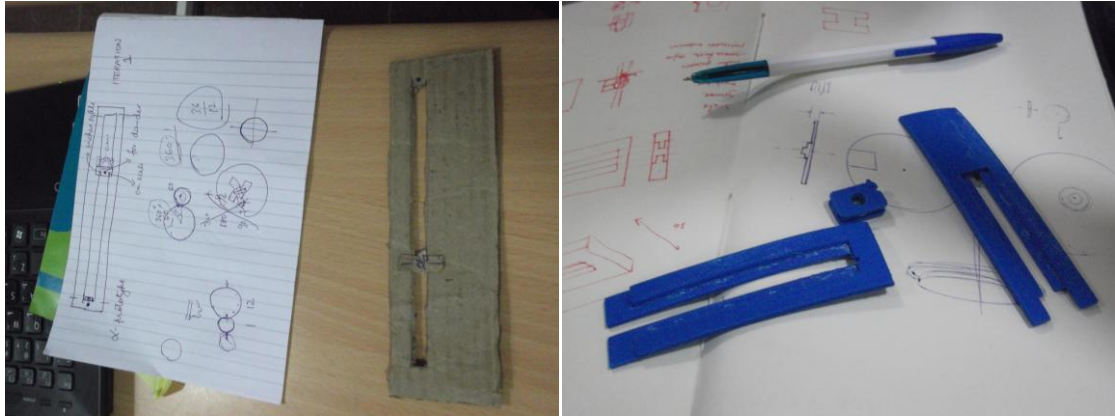
We encountered beautifully designed devices like the Taylor frame which was used by the students to learn Arithmetic and Algebra. The teachers told us that they faced difficulties in explaining the figures of geometry, making them understand heights and distances, and trigonometry among others. The state of affairs was so bad that the blind were exempt for learning and constructing Geometrical figures after a recent syllabus revision. This would only make them more helpless in pursuing higher education in the STEM fields. So taking this cue we decided to start work on a Geometric Kit for the blind.



Our Solution:

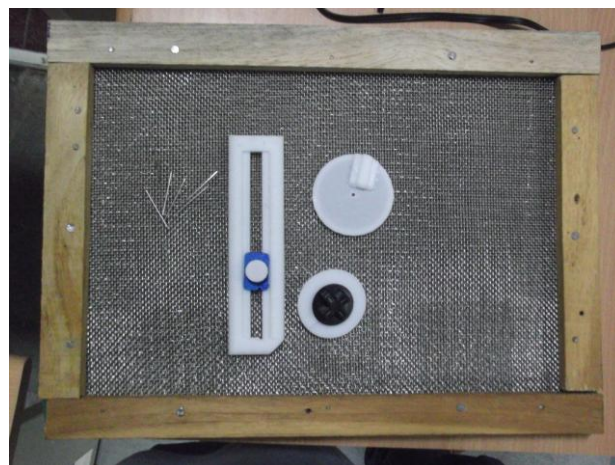
Our geometric kit was built to be used along with the existing tactile board which was used by the students for drawing. We brainstormed and started building a ruler. The ruler was designed to have tactile markings. We designed it to have a moving clamp

which can be fastened as the measurement required. While we were conceptualizing this we realized that we could modify the ruler to act as a compass as well. Thus incorporating this into the first model, we decided to try printing it. Our ruler was now 20cms long with 15 cms measurement.



As the 3D printer could not handle more than 12cms we broke the piece into two parts of 10cms each. We also printed the clamp separately. However the design warped and curled and we were left with an incomplete piece. We decided to make the ruler smaller this time and with some more detailing. Our attempts to get it were met with failure. Finally a day later and many failed prints later we were able to get it printed by placing it vertically. We put this together and added a screw and nut to the clamp.

While we waited for our ruler to print we decided to design the next component; a protractor. We wanted to make it as an additive component to the ruler. Hence we brainstormed and played around with various concepts of making measuring angles simpler. Finally we decided on a particular iteration, at least for user testing. We had to print this twice due to some problem with the printer.



We also built a mesh based tactile board with multiple mesh layers to help us test the instruments. We had decided to use dressmaker's pins to set a frame of reference for the blind students who would use it.

Testing the Product:

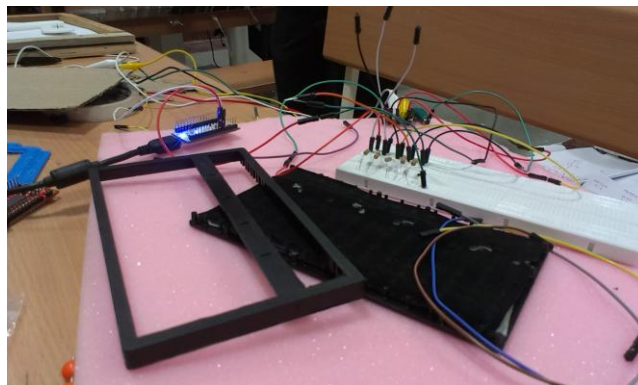
Now with the design in hand we headed out to 'Devnar school for the Blind' on Friday. The teachers and the students were excited about using the product.



Our user testing was again very insightful. By observing the students using it, we realized the problems in our designs. Our ruler passed the acid test but the protractor was not refined enough. They asked us to make it slightly bigger. The mechanism behind setting a frame of reference was also not up to the mark. We spoke to quite a lot of students and they could feel the markings, draw simple figures and understand how to use the instruments. They told us that they could use them well with more practice.

What Next?

Well the journey does not end here. We plan to refine the existing designs to make it more usable. We need to focus of how we could use the two components together more easily. We also planned to make an instruction manual available so that students can learn the techniques even if it's not part of their school syllabus. We are also working on other tools to aid the blind like an electronic abacus.



Conclusion:

The joy in the eyes of the students was enough to spark an interest towards designing for the differently abled. To infinity and beyond!