

The document contains a record of conversations that happened on March 8, 2019, at Devnar School for the Blind, Hyderabad. Although the language has been edited as and when required to fit the flow of the document, the content has been kept as pure as possible.

Introduction:

The Devnar School for the Blind was established by Dr. Saibaba Gowd, an Ophthalmologist and a Padma Shree awardee. Having worked in camps and treated VI children before, Mr. Gowd connected with the woes of the VI children as well as their parents regarding their education and survival in the society. Although their vision could not be restored, he established the schools in the hopes of giving them the means to make a living in the society, and the school has managed to achieve all that and much more with many of its alumni working in banks, government offices and even studying abroad. This school is the first English medium school for the blind in Andhra Pradesh and Telangana states, with classes till Class X and a high school in another campus till Class XII. The school is a hostel-based institute with few day scholars and has a solar-powered kitchen.

Questionnaire for Teachers for Visually Impaired (TVIs):

The following questions were collectively answered by Mr. Yadgiri Reddy and Mr. Naresh, who teach mathematics to the VI students, and Mrs. Hasina, who takes care of the school's computer lab.

1. How long have you been TVI?

We generally have an experience of over 5-7 years.

2. Have you also taught sighted students?

No. We were given training specifically to teach VI students and were subsequently recruited by Devnar School for the Blind.

3. Which subjects to what age groups do you teach?

The subjects taught are according to the *Telangana State Board Curriculum*, so it's the same as for any other teacher or school for the sighted. The only difference is that VI students are exempted from any question that involves figures or requires the student to perform geometric construction. So during teaching, subjects like geometry are taught theoretically only, no measured construction is taught. The age-class relation for the students is the same as that for sighted students.

4. What is the size and strength of the classrooms?

Classrooms are fairly small, having around 15 students sitting around the teacher like a square table with the teacher in the middle. However, ideally the teacher-student ratio should be 1:8 but due to lack of TVIs, some classes have around 20-25 students at a time (like the Class 9 classroom we visited).

5. Out of the total students, what proportion are partially VI and fully VI?

More than around 70% of students are fully VI, remaining are partially VI. We also admit a limited number of students who are both VI and have some form of mental issues. These students are not taught the usual curriculum, but basic lifestyle measures like taking baths, going to the washroom and so on.

6. Do they understand Braille?

Yes, they understand Braille and are taught Braille from Class 1 onwards.

7. What basics are taught initially and how does the teaching mature over time?

They are taught English alphabets in Kindergarten verbally, such that once they get to Grade 1, they are comfortable with English and then can proceed to learn English Braille.

8. How are they introduced to the most basic math/geometric concepts like lines and shapes?

They are introduced to lines and shapes through tactile graphics and 3D printed models of various shapes like spheres, cones, cubes, pyramids etcetera. Tactile graphics are also used to explain some concepts like transversals, triangles, tangents to circles, circumscribing and inscribing figures, heights and lengths of triangles, radii of circles, properties like refraction, concepts of parallelograms, intersecting lines and so on. For explaining concepts like parallelograms, we use these tactile graphics and by touch as well as using Braille scale, we qualitatively as well as quantitatively explain the concepts. They cannot construct shapes using rulers like sighted students. Instead, they make the shapes on Taylor Frame itself.

9. Can you help us understand how Taylor Frame is used?

Taylor frame consists of a board with a grid of 'octagonal holes' in which metal pieces called tabs can be inserted in 8 different orientations. Each tab is used in one of its two vertical orientations which makes it possible to denote 16 different characters using a tab. These include numbers, arithmetic operators, decimal points, even brackets, radical signs and special numbers like pi and a given set of alphabets for the remaining orientations which can be used by TVIs to denote a variable or a constant. Using this system, students can also represent exponents, subscripts, fractions by placing the tabs at the grid position along the direction in which we usually would represent on paper.

10. What subjects the students like the most?

Generally, students have a broad and varying interest in the subjects taught to them, similar to what can be expected from a group of sighted students.

11. What assistive tools/tech are used in teaching specific concepts?

For teaching math, Taylor Frame is used extensively for arithmetic operations as well as algebra. For teaching Physics, Chemistry and Biology, 3D models are used to give them a

feel of chemical reactions, shapes of molecules, the formation of orbitals while they are given tactile models to explain phenomena like reflection, refraction, mirrors and lenses. We even have human-sized models of the anatomy of the human body.

12. Do you also have a Computer Lab and what do you teach them there?

Yes, we have three computer labs and students from Class 6 through 10 have the lab thrice a week. Each computer has a screen reading software called JAWS installed on it. JAWS talks back each alphabet that the student types. The students can use the software to surf the internet, send and receive emails and use tools like Microsoft Office.

They have also started to teach C# in higher classes. There is also a new Indian software called Anupama which uses a regular scanner to scan pages of books and once done, it can read back to the user the entire book in audio.

13. Are there devices in the lab for low vision children?

Yes, there is a device called Optelec which zooms in portions of the paper/book that is presented onto the device.

14. Does the school have a Library or something equivalent?

Yes, the school does have a library. It is filled with books reprinted in Braille using their Braille printer. The books are of a pretty wide range of genre from sci-fi to novels, biographies, again, similar to what one might expect in a regular school.

15. What is the most expensive and cheapest tech/tool used in the school?

Braille scribes are the cheapest ones. They are used by all the students from Grade 1 through to Grade 10. The most expensive ones are the Optelec device in the computer lab for low vision students costing around INR 100,000 (USD 1,400) and the Braille Printer for printing books for the library costing around INR 300,000 (USD 4,200).

16. What training was required to make use of the tools in order to teach?

Training included having a good command over the Braille code but more importantly focused on the methodology that must be followed by TVIs for teaching VI students.

17. How proficient are these kids compared to sighted ones? Biggest advantage/disadvantage?

They have pretty sharp minds and at no point do they feel inferior to the sighted students in any way, especially when given appropriate care and assistance. Sighted students are obviously blessed with vision, but other senses in VI students are much heightened. In fact, none of them even needs a walking stick to get around in the campus, they only need to be guided around any given place once or at most twice and then they essentially navigate on their own without any assistance.

18. Are they given projects or something similar? If yes, how many of them do it?

Project work is given to a lot of students from various classes. But a few students from Class 10, who are old enough with a certain level of maturity and have a grasp of basic scientific concepts, are given the opportunity to work on science projects that are taken to state and national level competitions. One of their projects was even selected among the top 30 nationally, competing with ones made by sighted students.

19. What is the process of conducting exams (the medium in which questions are asked and answered) and how are they evaluated?

For Math: The questions are read out one or two times until the students have understood them. They then solve them on Taylor Frame and the answers are evaluated subsequently by the teacher just after they solve.

For other subjects: The questions are given on Braille paper and the students are also asked to solve them using Braille. For evaluation, the teachers usually discuss the solutions with four or five meritorious students and along with them evaluate the other answer scripts to save time and divide effort.

20. What all extra-curricular activities or sports are introduced to the students?

The students are introduced to cricket and it's their favorite sport as well, pretty much like a majority of the standard Indian population.

21. Are you aware of Fittle (educational tool developed at LVPEI Hyderabad)?

Yes. In fact, Srinath (lead designer) had been to Devnar School for the Blind to study Braille and implement it for Fittle.

The following questions were answered by Mr. Parmeshwaram who teaches Physics and Chemistry at Devnar School for the Blinds.

1. How long have you been TVI?

I have been teaching at this school for more than 8 years.

2. Have you also taught sighted students?

No, only the visually impaired students. I was an engineer in Emirates airlines, after which I took voluntary retirement and came here to teach. I have been associated with this school since its beginning though.

3. Which subjects do you teach to what age groups for the VI students?

Physics and Chemistry of high school level.

4. What basics are taught prior to you teaching them?

They are taught Braille and nuances of reading and writing. Since I teach only 9th and 10th graders, they have already studied middle school physics and chemistry.

5. How are they introduced to the most basic math/geometric concepts like lines and shapes?

We use tactile tools for most of our teaching along with verbal explanations. Everything from orbital shapes in chemistry to formation of images in optics is taught via tactical models.

6. If possible, can you give us a copy of the syllabus sheet or at least corresponding oral citation?

The syllabus is same as that of SSC (Telangana State Board) for sighted students and no changes are made for the VI students other than a few exceptions including geometry.

7. What are the assistive tools/tech used?

We use computer software like JAWS to teach them basic computer operations, and even other stuff like sending emails, listening to audiobooks etc.

8. How proficient are these kids compared to sighted ones?

They are all equally proficient, maybe more in some areas. It's the same as a normal school, some of them are better at grasping concepts than others. They are definitely better at remembering concepts as compared to sighted students. Once they understand something, they can do it by themselves.

9. Do you give them Homework? If yes, what kind of homework?

Yes, of course, they are given homework but not very frequently, and not new topics. We give them projects as well. In fact, their assessment requires them to finish a project in their academic year.

10. What percentage of them are able to solve on their own? How well do they solve?

They can solve similar problems themselves, for the most part. Some require assistance. Again, it is the same as for sighted children.

11. Are they given projects or something similar?

Yes, they are. As I said, it is part of their assessment. Some of them take it to the next level also, of their own accord. For instance, a team from our school participated in the National Telangana Science Congress and went on to the National level (after clearing district and state level) and won a gold medal. Their project was a portable solar mobile charger for farmers. And there's another team this year, they are working on making education involving electrical circuits safer for VI students by use of a Raspberry CPU and buzzers.

12. What is the best (and maybe the worst as well) part about teaching VI students?

There's no bad part, at least I don't think so. As for the best part, they are very attentive and focused. I believe sighted students can learn from them as much as these students can learn from sighted students. In fact, I am always learning something new from them myself while teaching. After all, learning is a never-ending process, isn't it?

After answering the questions, Mr. Naresh and Mr. Yadgiri Reddy showed us the 3D shapes and tactile tiles that they use for teaching mathematics. Then we explained to them our ideas to

get their feedback and suggestions. We showed them what Sarthak and team had come up with at LVPEI in January for measuring angles and constructing triangles of various dimensions. According to them, the idea does have potential because geometry is a difficult subject for VI and intuition for it doesn't come naturally to them. They would certainly like to see the prototypes and emphasized on getting regular feedback from VI students and TVIs.

Questionnaire for VI students:

The following questions were answered by students of Class IX at Devnar School for the Blinds, Hyderabad, on March 8, 2019. Around 20 students were present with 60:40 boy to girl ratio. Pravallika, Praveen and Sai Teja were few of them who actively participated.

1. What are the subjects that you study?

We are taught the same subjects as sighted students studying in the Telangana State Board. This includes Mathematics, Science, Social Studies, Computers, English, Hindi, and Telugu. Also, we have computers and science labs. The tactile and 3D models in science labs are incredibly helpful in understanding the subject. (Justifies our plan for making tactile tools for geometric properties)

2. What are your favorite subjects? Why?

Mixed replies by students.

We love Mathematics and Science. Our teachers are polite and they take time to explain the concepts. The best part about science is that we get to touch the tactile models in the lab which boosts our imagination. Also, we get to do science cool projects.

We love History and languages too.

3. How comfortable are you with braille?

Very. Comfort level increases with practice and we have been using braille rigorously since Class I (Pravallika wrote all the English alphabets in under 20 seconds. Their school starts with Kindergarten, but braille education starts in Class I).

4. What languages can you read and write?

Hindi, Telugu, and English. We are more comfortable with using braille for English than for local languages. (Braille for local languages is an issue)

5. What is your favorite assistive tools/tech, and why?

We love using the computer lab equipped with JAWS screen reader as it brings us closer to today's technology, i.e., the internet and computers. Also, we find Taylor Frame really helpful for mathematics.

6. Do you know about Talking Calculators?

Praveen: Yes! I know about it. But we don't use it here. Also, we have brains and can do the calculations on our own.

7. Do you get homework? If yes, do you like doing it, or do you take help?

We get homework regularly and as most of us live in the hostels of the school, we do it independently without any help from our parents. Moreover, we love doing homework as practice makes us more comfortable to understand the concepts and visualize them better (Although a few of the students were not so agreeable, that is only natural for students of Class IX).

8. Are you given projects or something similar?

Yes. We have a science exhibition every year where students from all classes present their projects. Moreover, in Class X, a few students are selected to take part in project work that they present at state and national level.

9. Do you need help from sighted people or parents/guardians?

At school, we don't need any help other than our friends. Together we are interdependent and independent at the same time. Here we walk without any walking stick as they might hinder other VI students' movement, and also we don't feel the need to use them as we know the place quite well.

10. What kind of games/puzzles do you play?

We play cricket a lot here in the school's courtyard.

Praveen: I love solving math's puzzles (He asked us if we had any, but we didn't anticipate this and couldn't give him one. Although, he did tell us square roots of a few perfect squares).

We had a few more questions but couldn't ask as the students were running late for their lunch break. Also, during our conversations with Praveen and Sai Teja, we told them about Mars and space exploration and they looked pretty interested in the same. In fact, Sai Teja had some questions about how to send satellites to space. Honestly, we felt that these students are not much different from sighted students and have creative dreams and ambitions, only that their world is a bit different.