

TechBridgeWorld

We are a research group at Carnegie Mellon University, spanning education, research, development, deployment, and outreach. We are dedicated to defining the role of technology in sustainable global development.

Carnegie Mellon



TechBridgeWorld

To this end, we work to increase the diversity of both creators and consumers of technology.



Programs



Adaptive Braille Writing Tutor



V-Unit:
Learning to Build a Vision



Project Kané



Cambodia Project



DeSIGN



Education e-Village

Get Involved!

- ❖ Become a TechBridgeWorld *Sponsor*
- ❖ Become a TechBridgeWorld *Partner*
- ❖ Become a TechBridgeWorld *Faculty Advisor*
- ❖ Become a TechBridgeWorld *Student*

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TECHBRIDGEWORLD

Microsoft Research India (MSRI)

- Established in January, 2005
- Cutting-edge and applied research in computing, information technology and related areas
- Technology for Emerging Markets Research Group
 - Address needs and aspirations of people in emerging-market countries
 - Technical and social science research
 - Emphasis on rigorous research and exploratory pilots, rather than product or business development

Mathru Educational Trust for the Blind



- Non-profit voluntary organization dedicated to **educating** and **rehabilitating** visually impaired children
 - Free education, housing, clothing, food and health services
 - Founded by Ms. Gubbi R. Muktha in 2001
 - Located in New Town, Yelahanka, Bangalore
 - Currently has 73 students in standards 1 – 8 and 10
- Mission
 - *"...to provide basic needs, fundamental confidence and economic stability to the visually challenged through education, training, skill development, and placement."*

Curriculum

- Major emphasis on reading and writing Braille
 - Slate and stylus + Braille Tutor
 - English, Kannada and Hindi Braille
- Math
 - Counting boards, Trailer Frame and Nemeth code
- Math and Science discontinued after 7th standard
 - Lack of skilled teachers
 - Difficult to teach without use of visuals



Students

- Mostly from rural and semi-rural areas
- Parents are poor and illiterate
- 85% completely blind
 - Mostly blind at birth
- Before coming to Mathru
 - No hygiene or toilet habits, bad posture, skin disease, health issues
- At Mathru
 - 1-3 months for developing hygiene habits and going through medical check ups

Teachers & Volunteers

- Teachers
 - 5 permanent blind teachers, 3 sighted teachers
- Volunteers
 - Teach curriculum classes for students
 - Teach extra classes
 - Spoken English, music, general knowledge, nursery rhymes, etc.
 - Assist with administrative tasks
 - Organize competitions

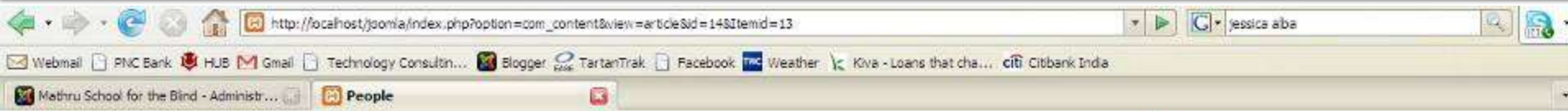
Typical Day at Mathru

Time	Activity
5:00 a.m. – 5:30 a.m.	Hygiene
6:00 a.m. – 7:00 a.m.	Yoga and Prayer
7:00 a.m. – 8:00 a.m.	Cleaning of the school
8:00 a.m. – 8:30 a.m.	Breakfast
8:30 a.m. – 9:00 a.m.	School Assembly
9:15 a.m. – 1:30 p.m.	Classes (1 hour duration)
1:30 p.m. – 2:00 p.m.	Lunch
2:00 p.m. – 4:00 p.m.	Classes continue
4:00 p.m. – 5:00 p.m.	Playtime
5:30 p.m. – 6:00 p.m.	Prayer
6:00 p.m. – 9:00 p.m.	Study time
7:00 p.m. – 7:30 p.m.	Dinner

Scenes from Mathru



Website



Mathru School for the Blind



For free education, vocational training, skill development, placement, food and accommodation for the blind.

- HOME
- ABOUT
- MATHRU EXPERIENCE
- PEOPLE
- PROGRAMS
- MEDIA
- DONATE
- CONTACT



PEOPLE

The trust, instructors, volunteers, and staff are the backbone to the Mathru School and are a big part of the reason why the school is able to make the impact that it has today. Please read on to find out more about the people behind the Mathru School.

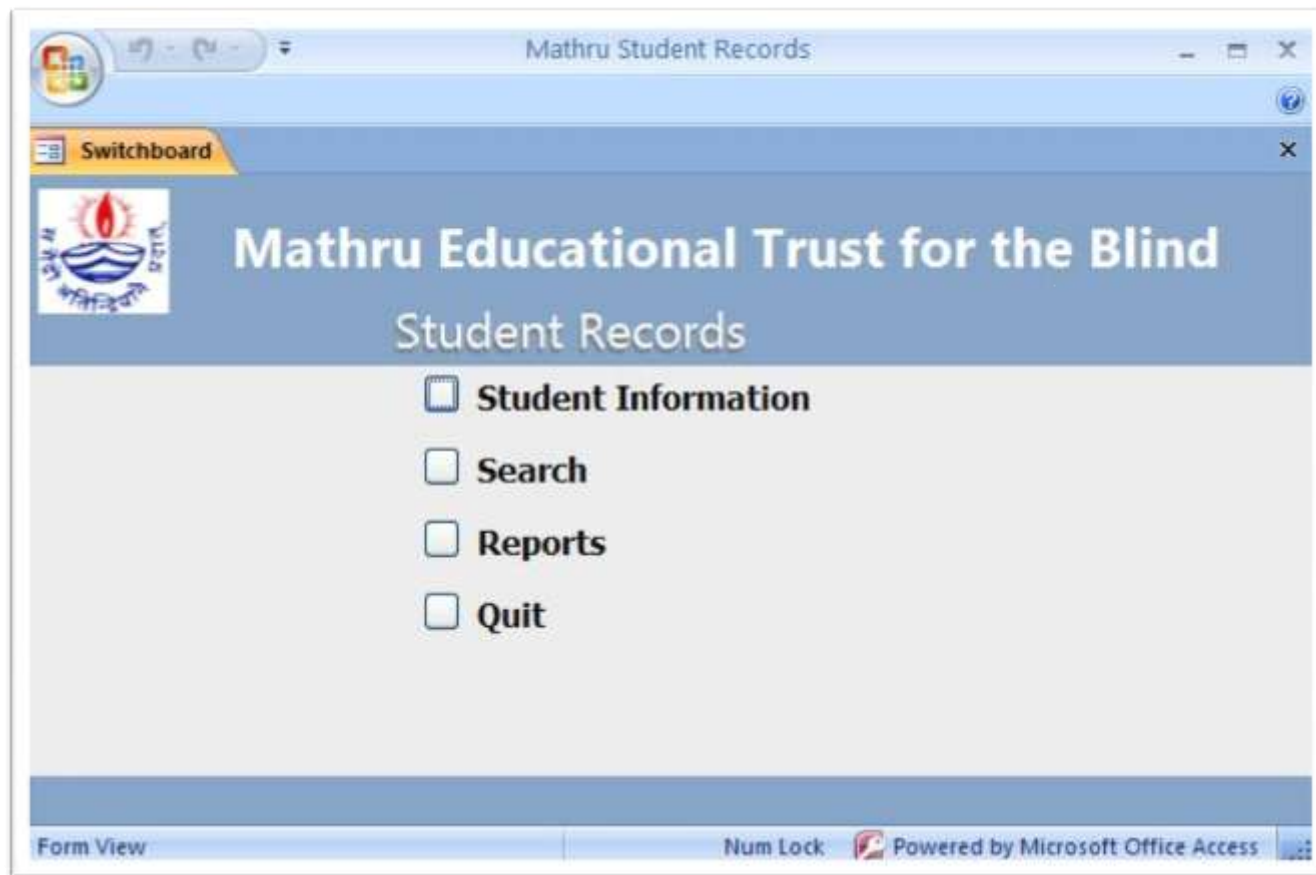
- Trust Members
- Teachers
- Volunteers
- Staff



Goals

- Internal
 - Easy-to-use
 - Sustainable
- External
 - Comprehensive website
 - Increased awareness and donations
 - Professional looking website
 - Credible and “worthy” of donations and support

Digital Records



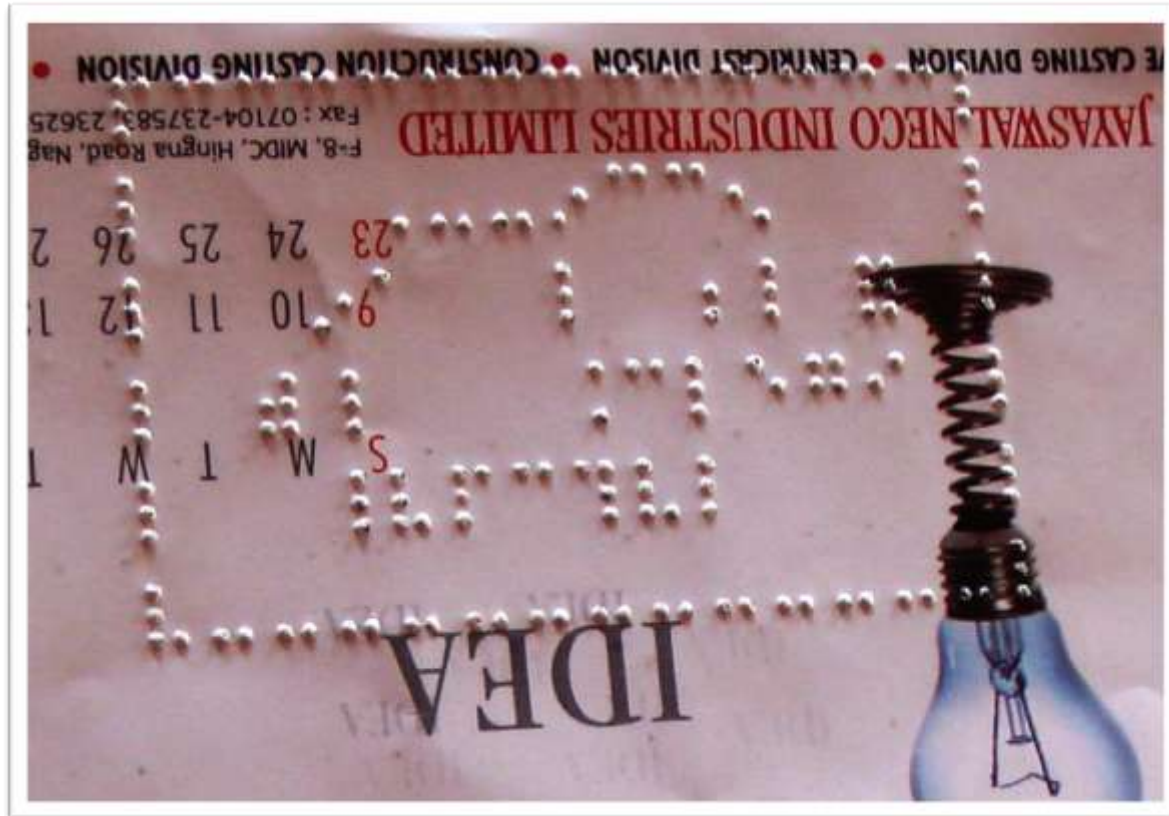
Digital Records

- Student Records
 - Student details, medical check-up details and grades
 - Add, edit and maintain student information
 - Print custom reports
- Incomes
 - Maintains a record of donations received
 - Print monthly and yearly reports (+ custom reports)
- Expenses
 - Maintains a record of all the expenses incurred by the school
 - Print monthly and yearly reports (+ custom reports)

Goals

- Meet their needs
- Easy-to-use
- Sustainability

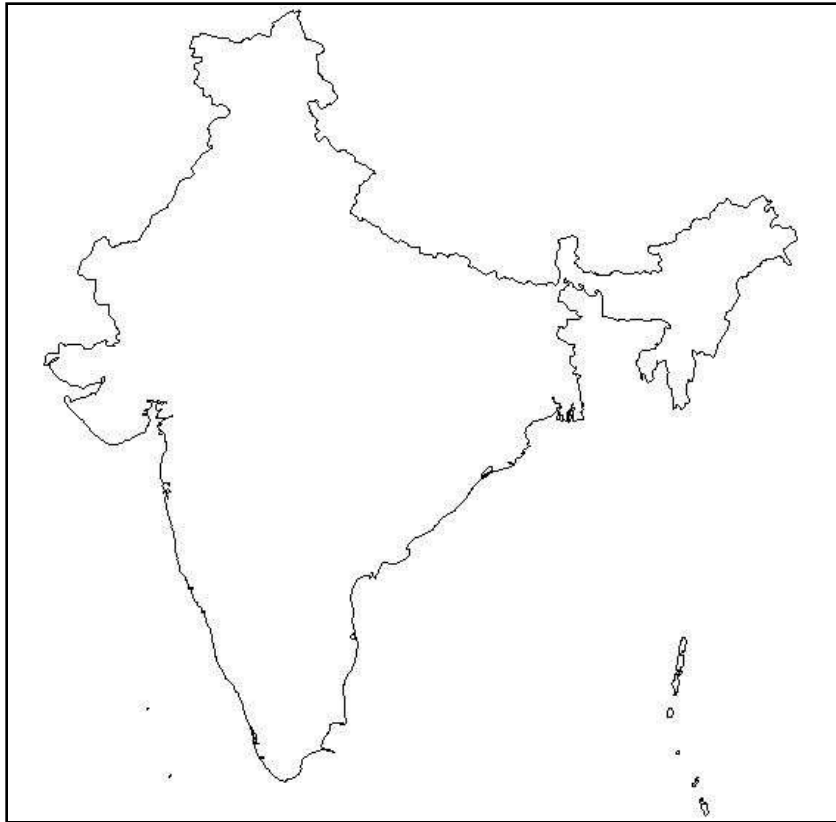
Braille Art Imaging Project



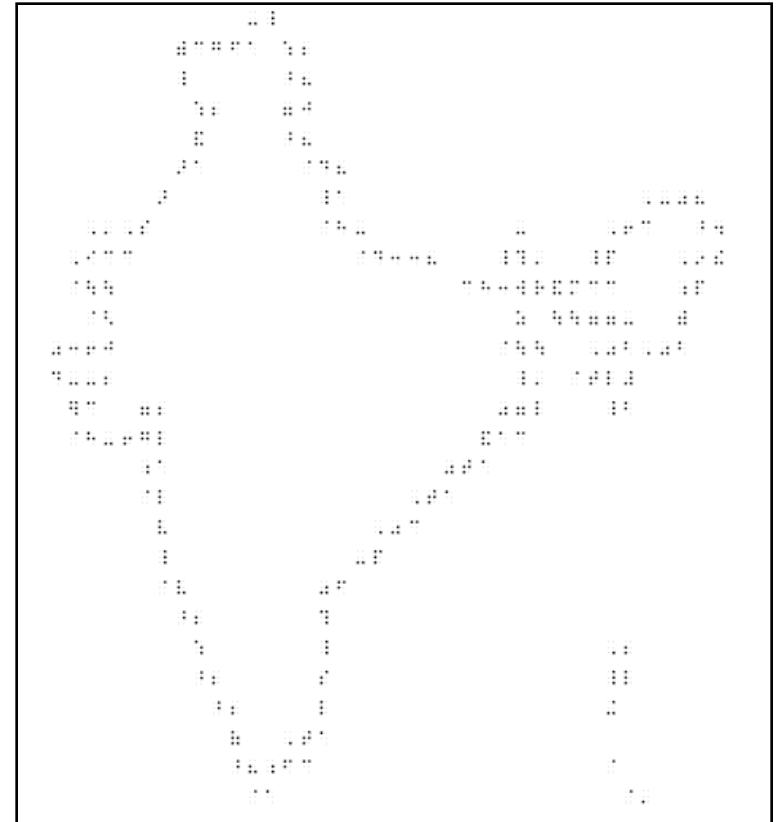
Motivation

- Lack of pictures in Mathru curriculum
- Lack of printer functionality to print pictures
- Well received initial test
- Advanced Braille embossers are expensive

Overview

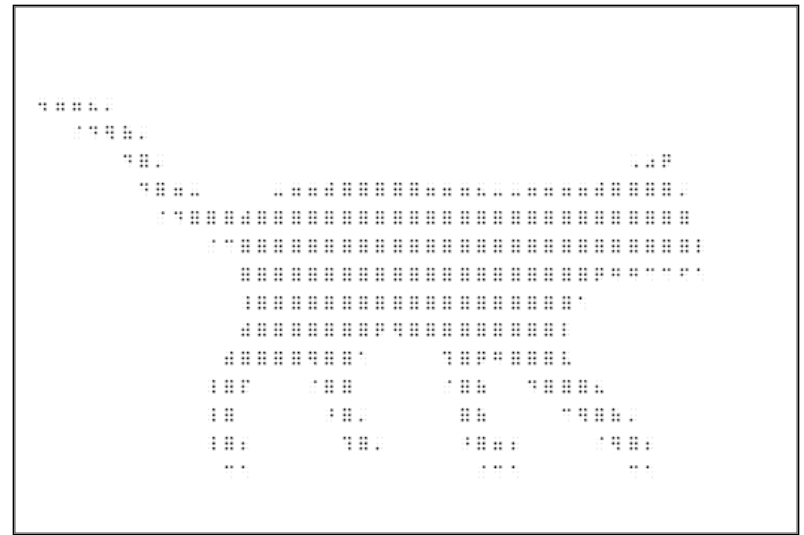
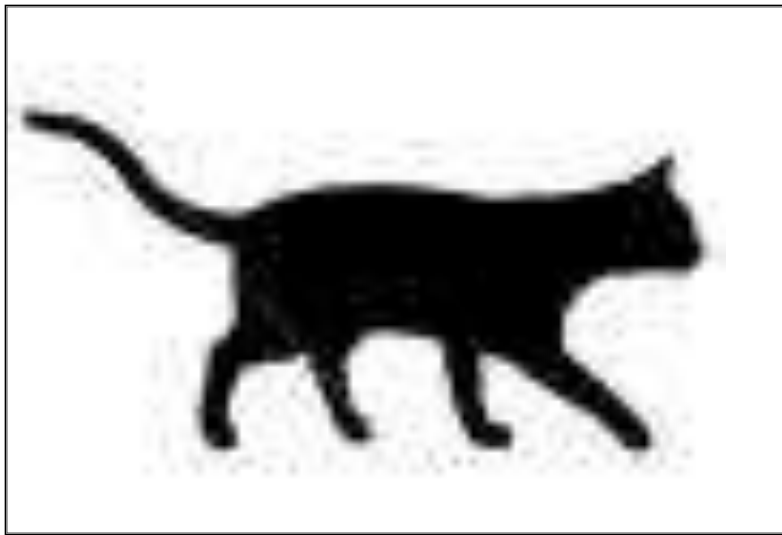


BMP/JPEG Image

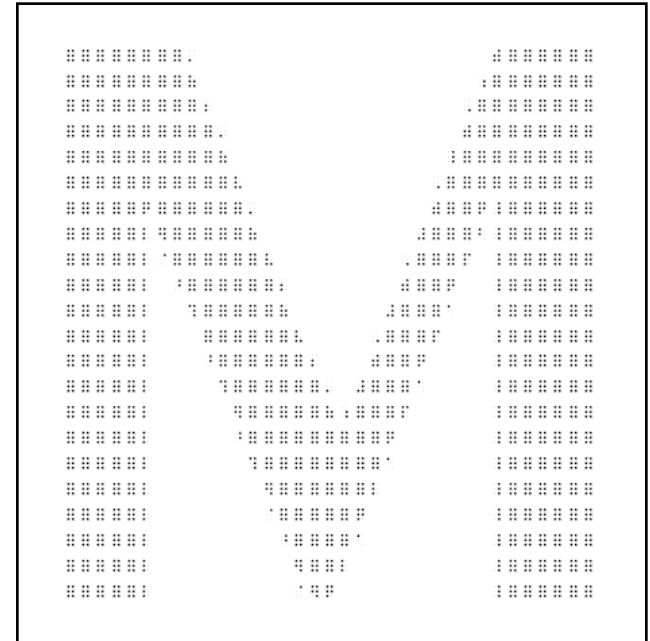


Embossed Image

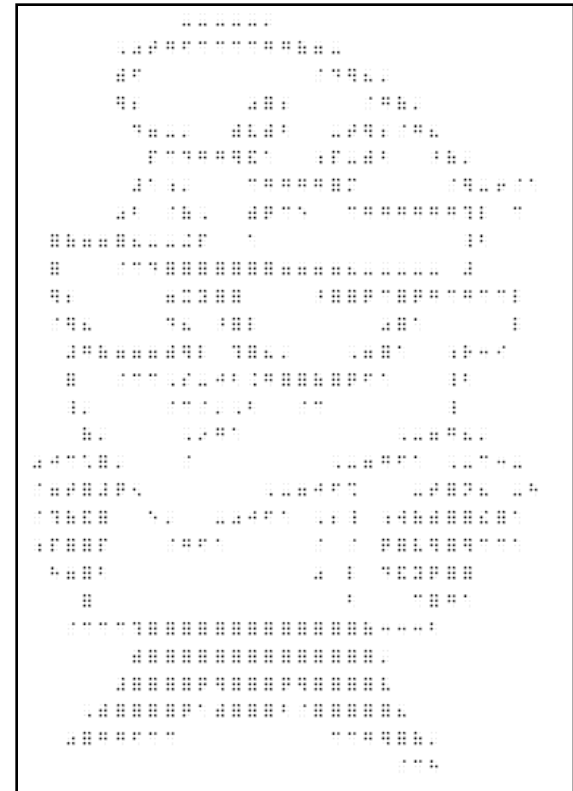
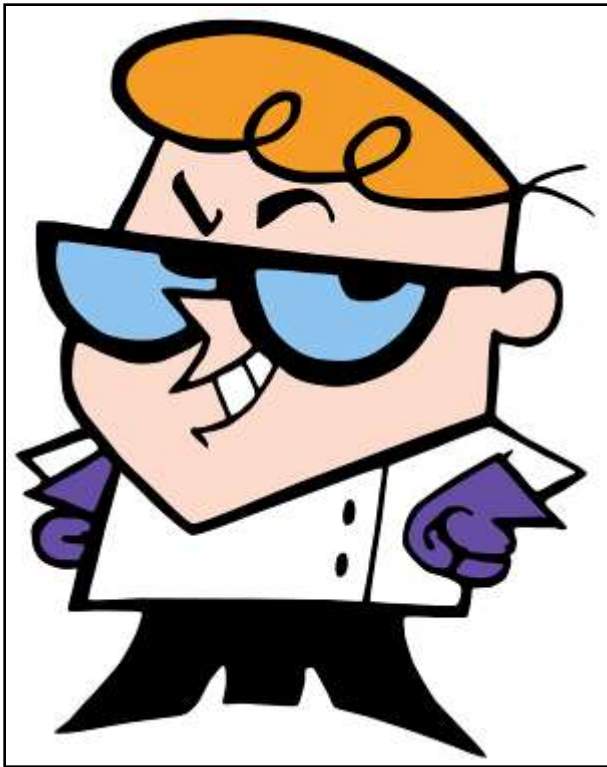
Examples



Examples



Examples



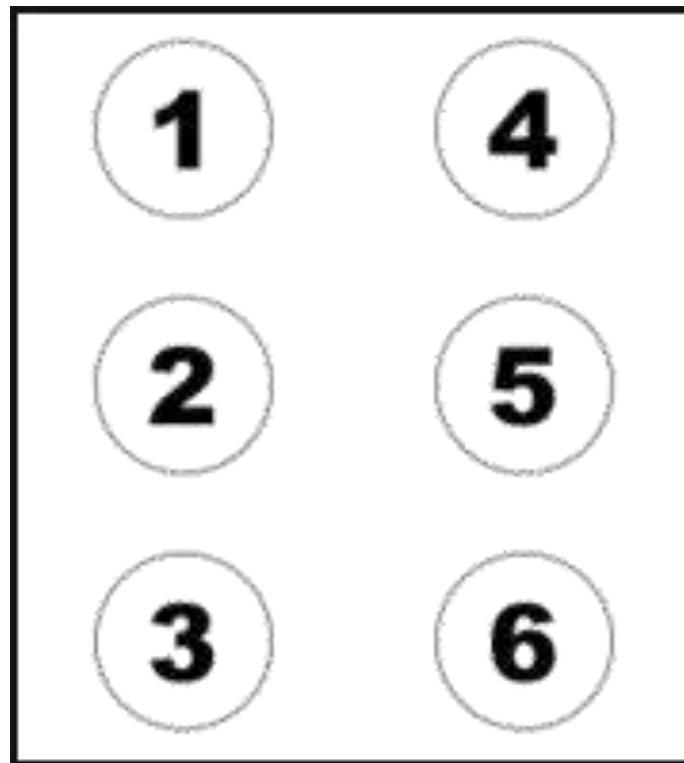
Adaptive Braille Writing Tutor



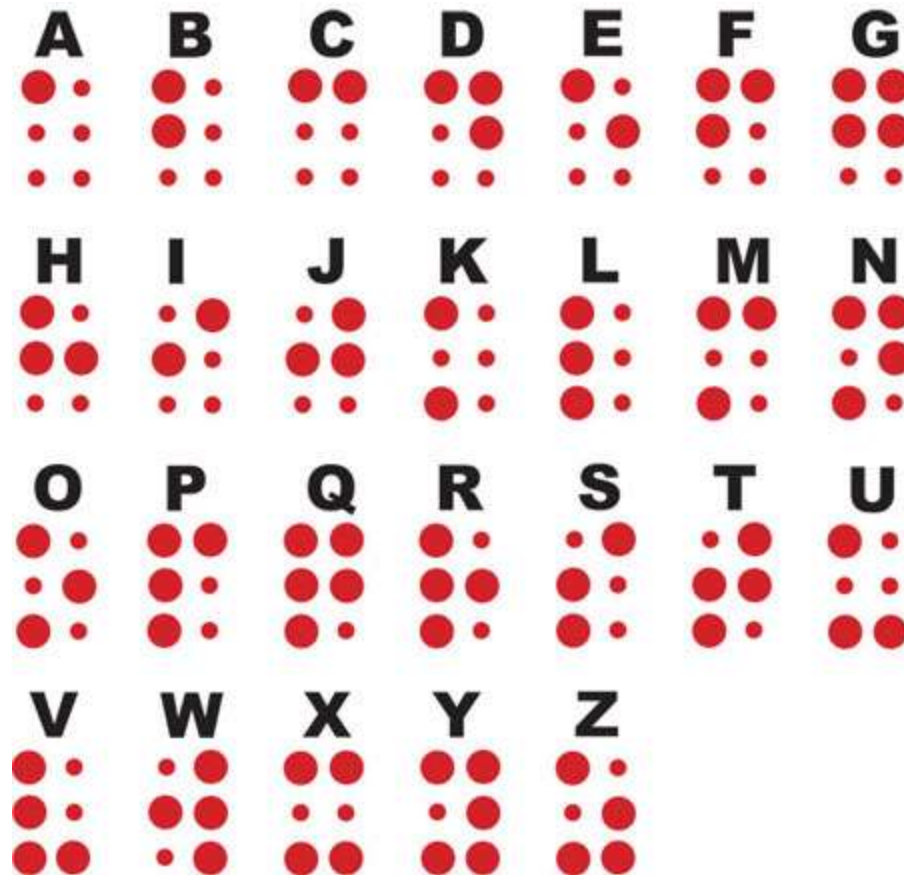
Why Teach Braille?

- USA
 - 12% of 55,000 legally blind children in the United States can read Braille (NBP)
 - 90% of employed legally Blind are literate in Braille (AFB)
- Developing Communities
 - 161 million blind (WHO)
 - Below 3% literacy rate (Schroeder)

Concept of Braille

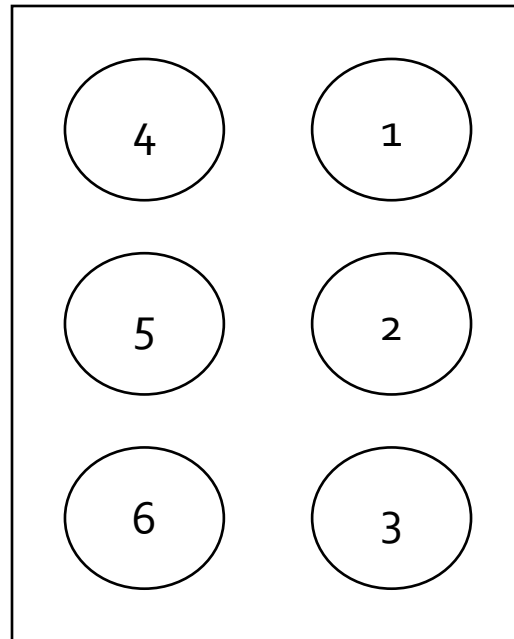


Reading Letters



Writing Letters

- Slate and Stylus
- Dot patterns are flipped for writing



Braille Tutor Curriculum

- 3 modes for learning and testing dots
- 1 mode to learn the dot patterns of letters
- 1 mode to test dot patterns of letters
- 1 mode for free spelling
- 1 mode for hangman game
- 1 mode for animal game
- 1 mode to learn Nemeth Code (Braille math notation)

Goals of Field Testing at Mathru

- Observe students' reactions to changes in tutor
- Observe if tutor is at stage where it can be distributed widely
- Find out improvements that can be made in future
- Test different hardware features to see what students like best
- Run a couple of controlled experiments to see educational value of Braille Tutor

Research Questions

- Does the Braille Tutor allow students to learn Braille at a younger age?
- Does the Braille Tutor speed up the process of learning how to write?
- Do students view the Braille Tutor as being a game?
- Can the Braille Tutor be expanded beyond just being a writing tutor?

Experiment Design

- Control Group of 9 (1st and 2nd standard students)
- Test Group of 9 (1st and 2nd standard students)
- All students given pre-test and post-test

Test

- Test the following steps:
 1. 6-dot concept
 2. Letter patterns
 3. Whether or not they can use a slate and stylus
 4. Writing letters A-Z
 5. Writing words

Outcomes of Field Study

- All 1st standard students using the tutor now understand the 6 dot concept
- Teachers want to use the tutor with the control group
- Games allow older students to use tutor
- Students enjoy learning on the tutor
- Major problem with reading still exists

Future Work

- Expanding language capabilities to Arabic, Chinese, and French braille
- Add functionality to tutor to help read in braille
- Create device that can be used without computer
- Longer field tests to measure tutor's educational value
- Develop games that test different language skills

Future Work

- Recently launched at Sefula School for the Visually Impaired in Western Zambia



Conclusion

