Tactile Graphics & Inclusive Education

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Inclusive education

happens when children **with** and **without** disabilities participate and learn **together** in the **same** classes

Current Situation

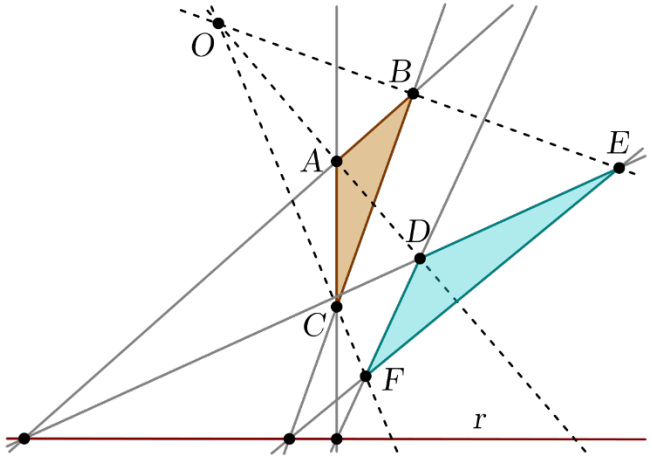
- Most schools do not admit visually impaired children
- Educational text books do not have diagrams to support concept understanding
- Students are not able to go for higher secondary education in science/math

Reason

- Lack of tactile resource development facilities
- Lack of expert designers
- Lack of special educators
- Lack of automated and economical techniques for creating tactile diagrams

Need for graphics

- To enable students to understand concepts which require reference to diagrams in subjects like Math & Science with ease



- To make education in all schools and colleges inclusive

Centre of Excellence in Tactile Graphics

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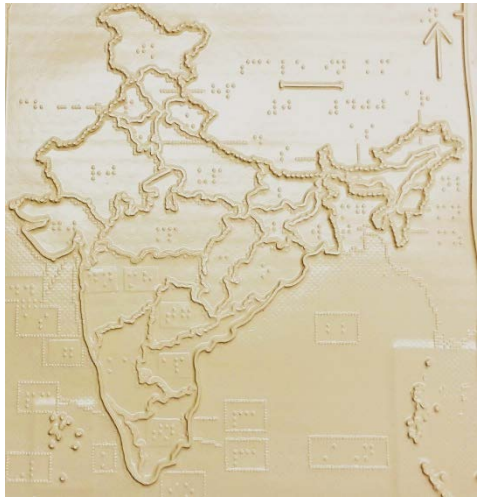
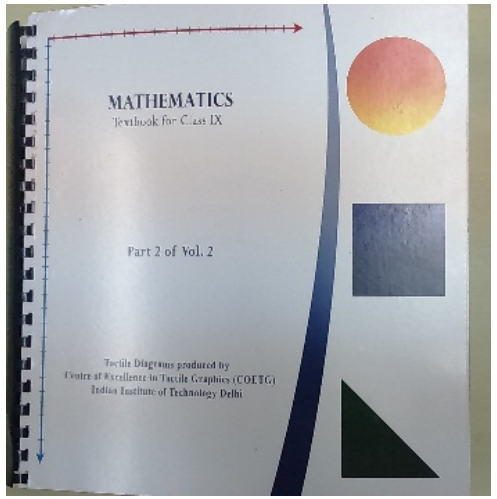
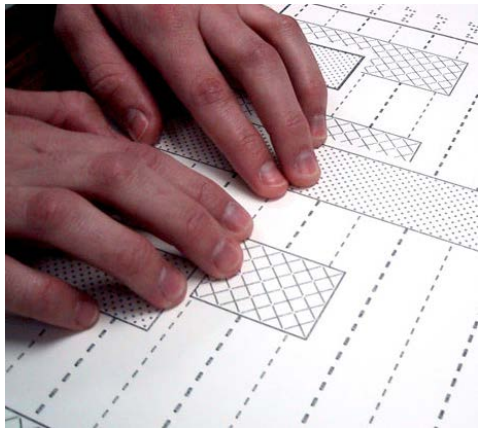
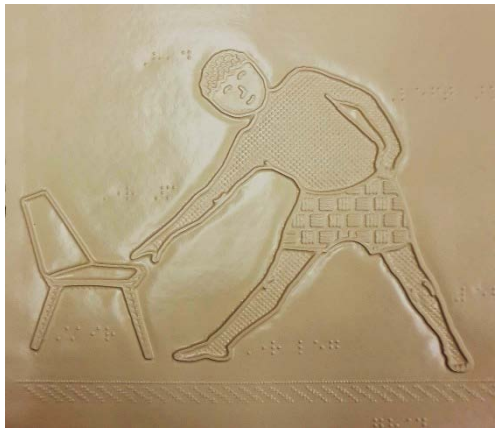
Projects

- Successfully Completed books
  - Physiology and Anatomy for training physiotherapists
  - Yoga for teaching yoga to visually impaired
  - Maps of India (Geography)
  - Introductory book on Economics
  - NCERT 9th Mathematics Book
- Work In Progress
  - NCERT 9th Science Book

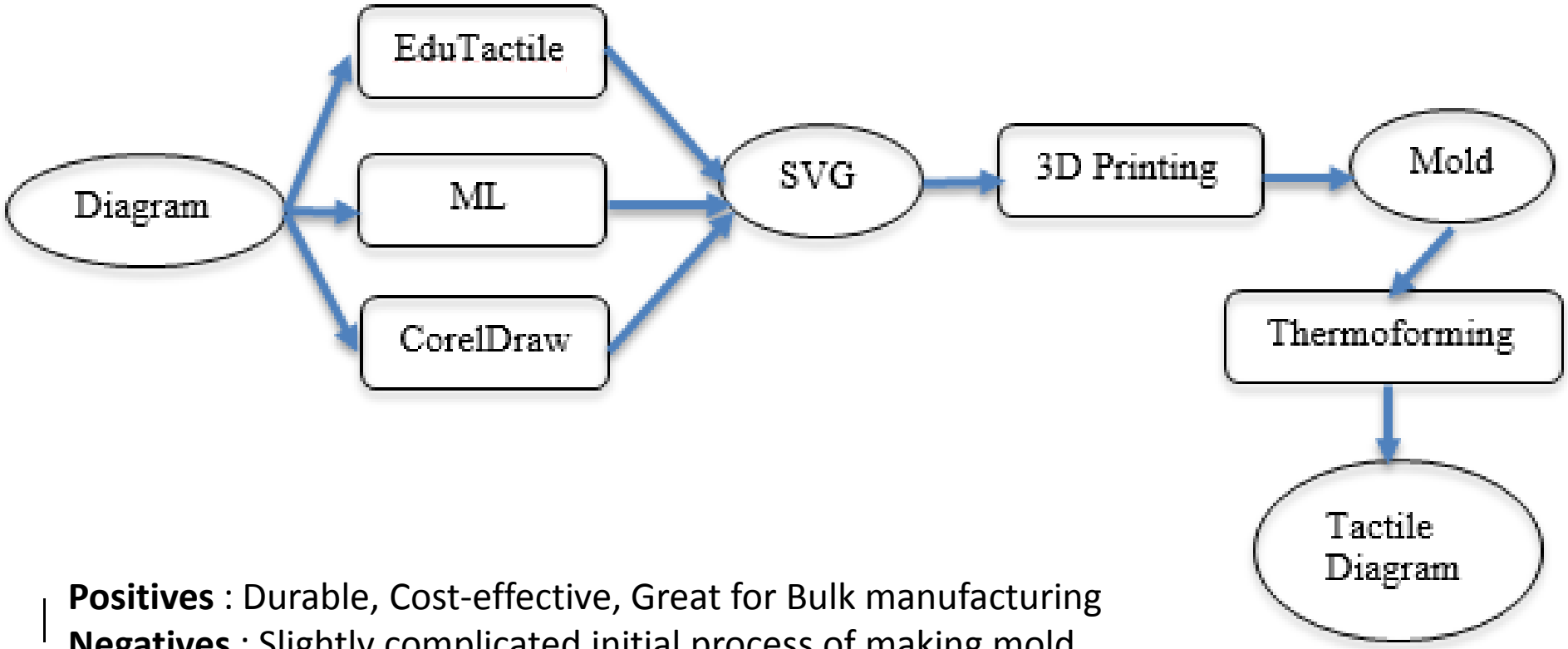






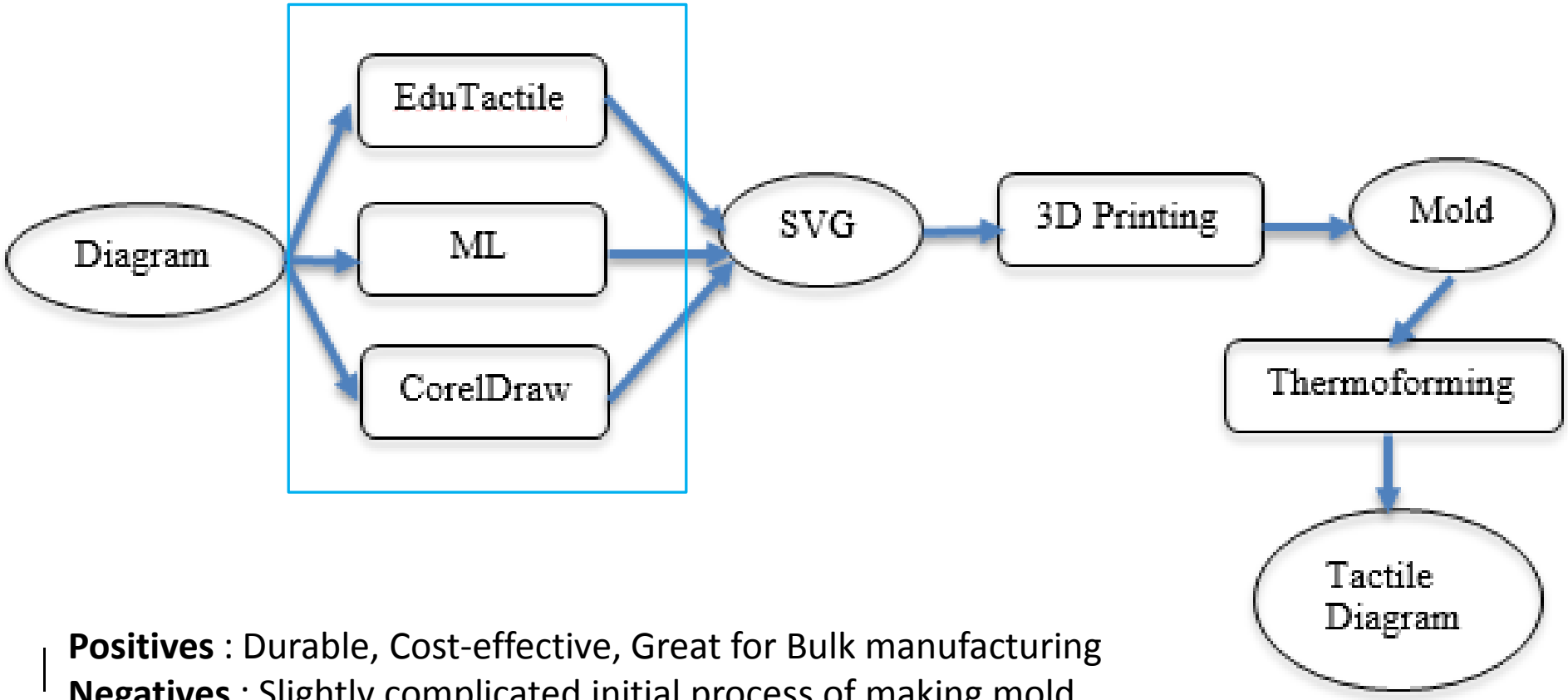


Process



Positives : Durable, Cost-effective, Great for Bulk manufacturing
Negatives : Slightly complicated initial process of making mold

Process



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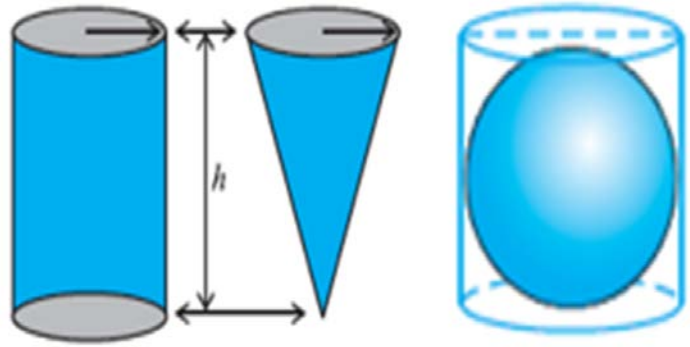
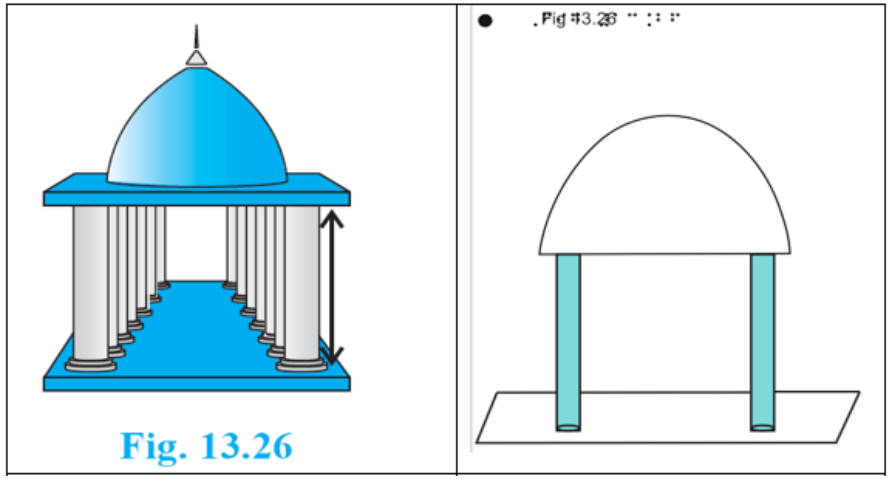
Graphic Conversion

- **Simplification** - If the 2D diagram has too much detail then it is simplified by removing unnecessary detail and information.
- **Decomposition** - Process of dividing the information to be presented across a number of tactile diagrams to avoid overwhelming the readers.
- **Selection of view** - Tactile graphics portraying unusual viewpoints like perspective view, transparency could cause difficulty in comprehension.
- **Scaling** - Unnecessarily small and cramped diagrams can cause difficulty in comprehension. However, a large tactile diagram can make it difficult for the learner to get a sense of the whole.

Design Challenges

- Pictures for sighted people contain various artifacts that might be redundant or confusing to the visually impaired person
  - Decorative items – decorative borders, shadings etc
  - Colorful illustrations and artwork
- 3D views or Perspective – How an object reduce in size or become skewed
- Reflection and Transparency – object is occluded yet its visible





Potential Research Questions

- How can the concept of depth be represented in tactile diagrams?
- How well can a person interpret different layers of information in tactile?
- Can we define tactile perception attributes analogous to visual perception attributes?
- How can different view points (perspective) be represented ?
- How does a visually impaired person forms a mapping between the spatial relationships in a diagram and spatial relationships in real world?
- How can we convey the scale of bigger objects like mountain, ocean etc?
- How the mind integrates and makes meaning out of the perceived piece-meal information?

Steps towards an Inclusive Future

- Investigating these research directions to make TG more effective
- Making graphics a part of the curriculum
- Making it affordable and easily available
- Making it accessible for blind as well as sighted
- Coming up with a standardized training and introduction program
- Teacher friendly material and training programs for teachers
- Reaching out to the largest blind population in the world


"THE ONLY THING WORSE THAN BEING BLIND IS HAVING SIGHT BUT NO VISION."
HELEN KELLER
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