Digital Audio-Tactile Graphics

for Inclusion in Education, the Workplace and Everyday Life

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Agenda

- Significance of Graphics in Everyday Life
- Theoretical Foundation
- Graphics in MINT Disciplines
- Examples of Technologies
- „Dotted Pictures“ Demo
- Conclusion

Significance of Graphics in Everyday Life

- Technical, mathematical, and natural scientific contents are regularly conveyed in diagrams and graphics.
- Visually abled persons communicate complex concepts in by drawing sketches.
- Technological advances make graphics increasingly accessible by tactile and audio-tactile representation.

Theoretical Foundation

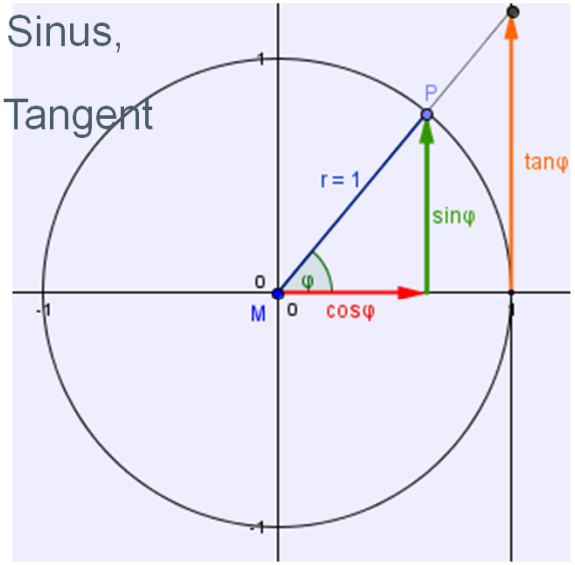
- Permanent human activity and creativity are dialectically shaped and shaping by evolutionary sense-making and sense-giving in a particular society (Berger & Luckmann, 1966).
- Our steady awareness and coping processes draw on jointly agreed symbols and wordings for collective sense-making (Dewey, 1925).
- Thus, social construction of technology is achieved by negotiating and politically translating facts, artefacts, and devices as technical objects in a semiotic context, thus generating common symbols laden with proprietary meanings (Prell, 2009).
- *Ontological complicity* with other members of our habitat is established, reducing stress in a specific socio-economic environment (Bourdieu, 1989, 397; Krais & Gebauer, 2008).

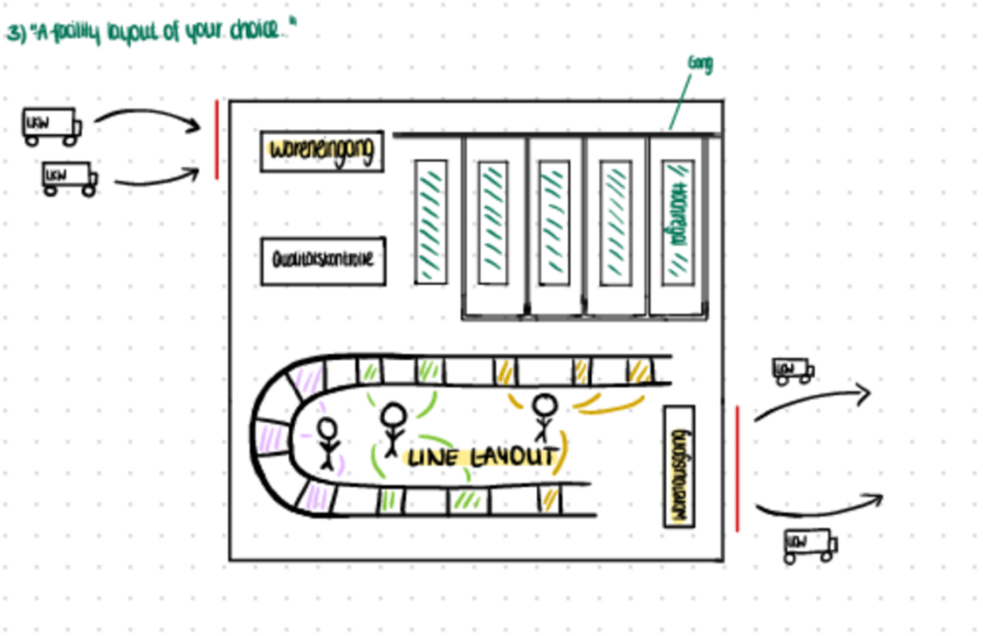
Graphics in MINT Disciplines

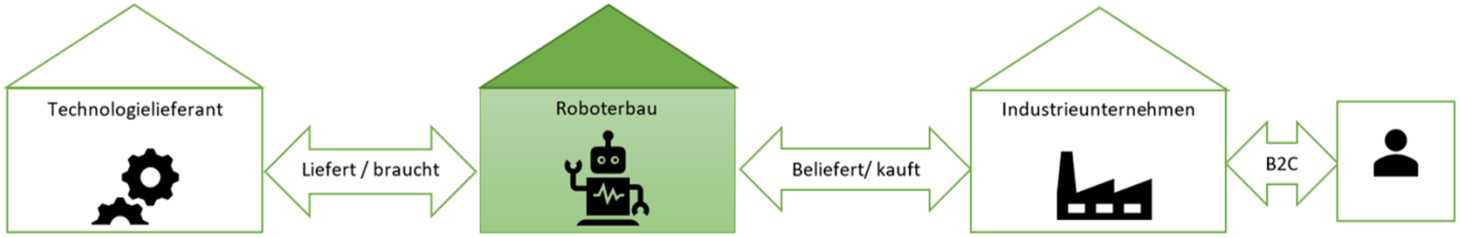
- In education, the term of subject didactics has been established (Vollmer, 2014).
- This concept accounts for the particular challenges of teaching complex, meaning-laden contents.
- Not only communication and reproduction of subject-related skills and capabilities are required. Nägele & Stalder (2017) emphasise that, from early childhood, transfer into other domains of our habitats enable us to establish a self in all situations.
- This is why blind and visually impaired persons often find themselves in cognitive isolation (Marinho et al., 2016).

Examples: Mathematics, Logistics

Derivation of Sinus, Cosinus and Tangent from a Circle







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Examples of Technologies

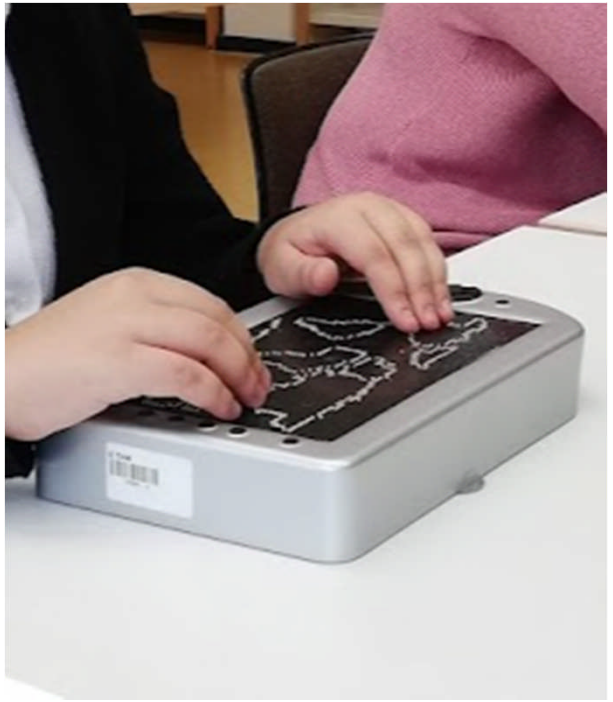
1. Audio-tactile system

Tactonom Reader (Inventivio):

Tactile prints
Camera from the top
Digit position recorded
Several buttons for information request
Audio information
Price: 5.000-10.000 € depending on volume of graphics to be converted
Handling: static

Examples of Technologies

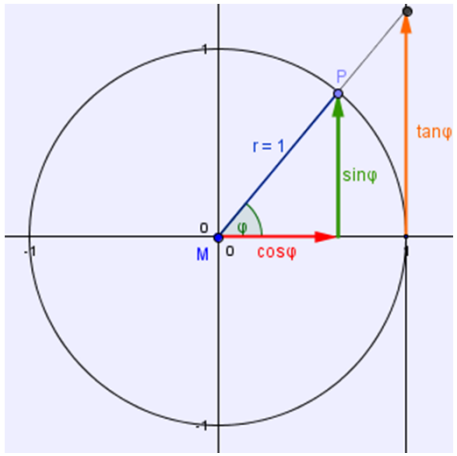
2. Tactile/ audio-tactile system

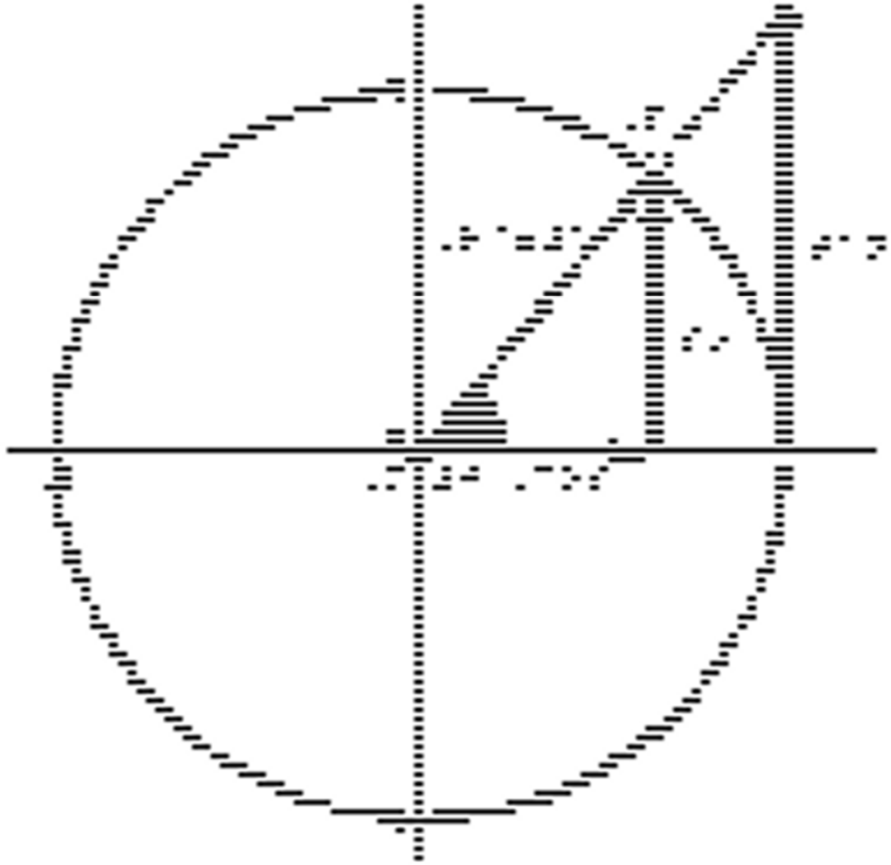


Braille Pad (Metec):

Tactile electronic surface
Digit position recorded
Audio information
Several buttons for resolution and orientation
Self-service conversion of graphics by „Dotted Pictures“
Price: from 15.000 €; no variable costs
Handling: mobile

„Dotted Pictures“ Demo: Trigonometry





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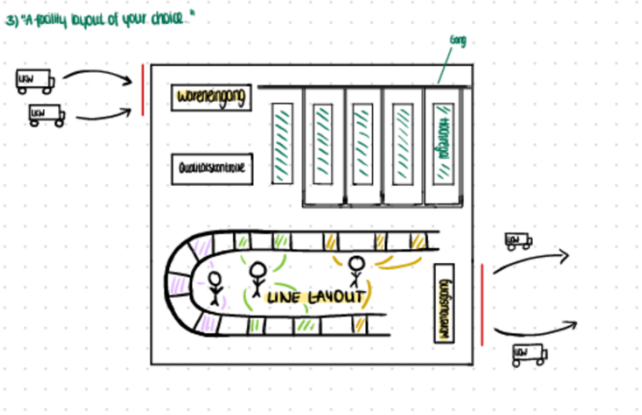
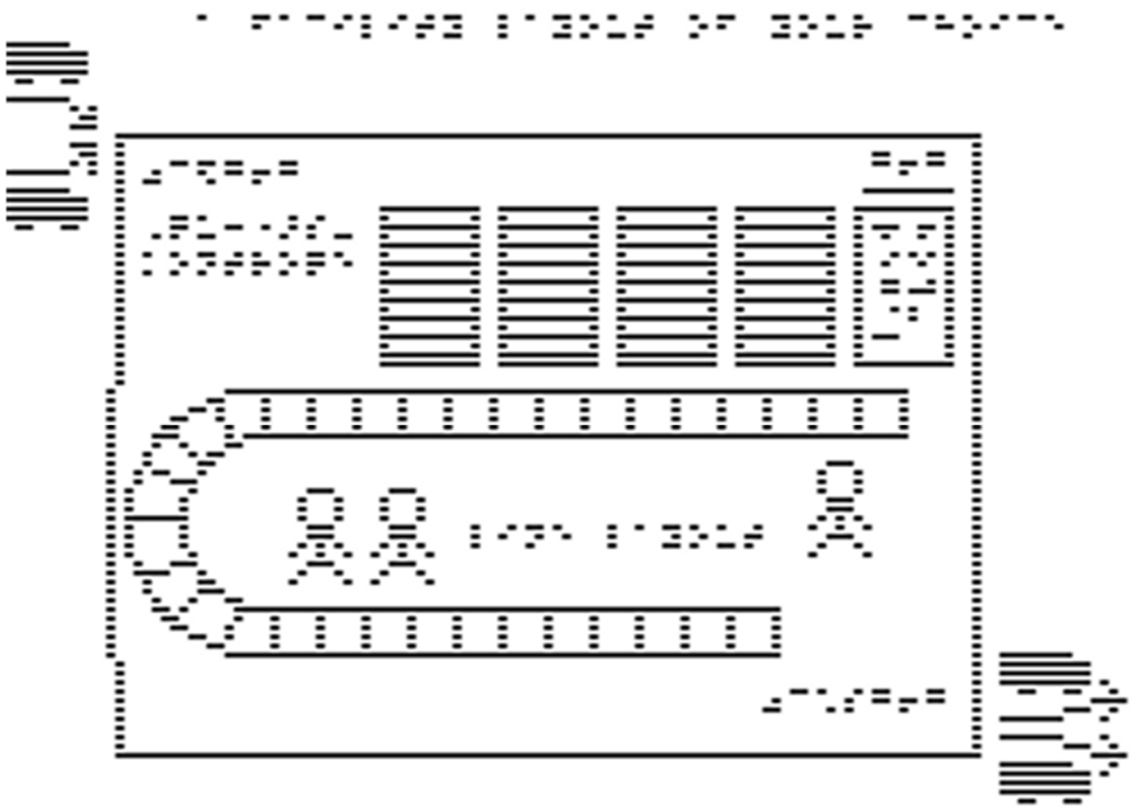
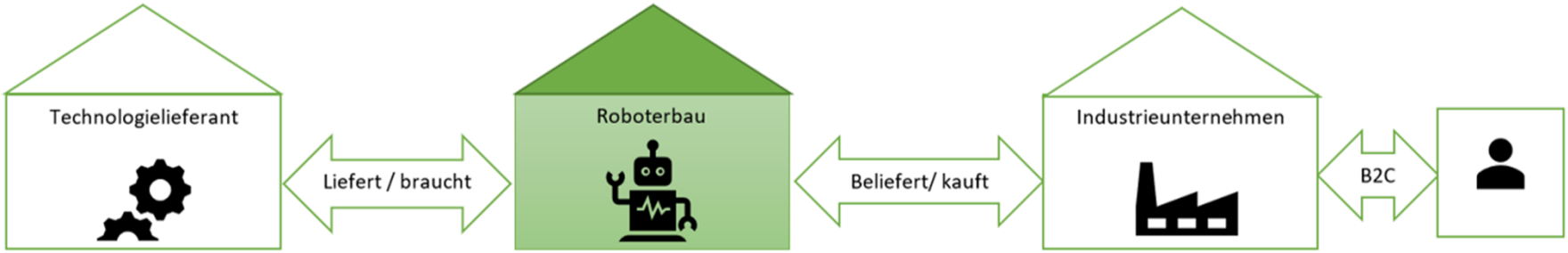
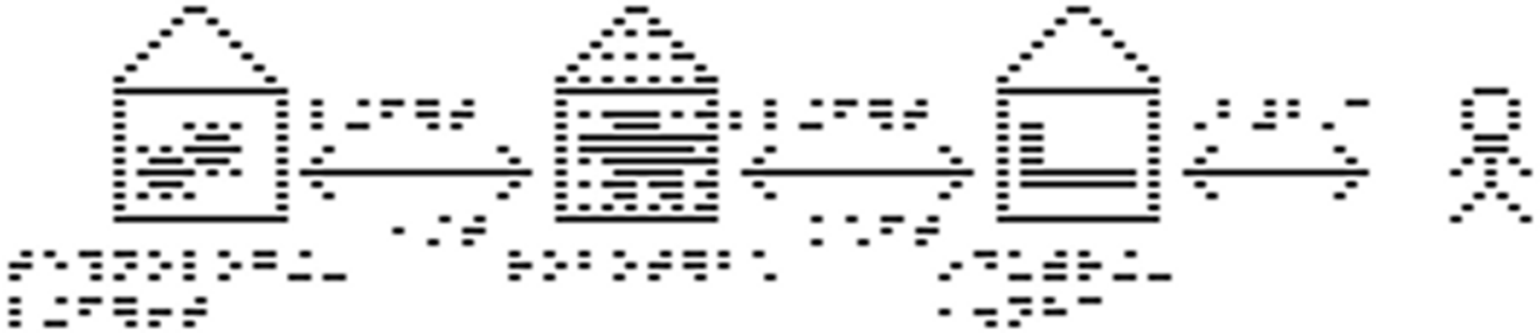
„Dotted Pictures“ Demo: Logistics Layout





„Dotted Pictures“ Demo: Value Chain





Conclusion

- Research and development of „dotted pictures“ currently ongoing
- Practicability tests with BliStA in Marburg (special school for visually disabled)
- Long-term perspective for application in early childhood programmes
- Print-out of „dotted pictures“ as affordable option
- Beta programme available on request

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Thank you for your attention!

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