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INFORMATION
TECHNOLOGY

new and under-used strategies for accessible graphics in higher education

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GROUP OF EIGHT AUSTRALIA

Outline

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1. Background: OLT Project "Improving vision impaired students' access to graphics in higher education"

2. Practical strategies for accessible graphics:
   a) identifying which graphics need to be made accessible
   b) choosing the most suitable technique for access
   c) sharing expertise – groups and resources

Our team

- Led by Monash and Deakin Universities
- Team members: Kim Marriot, Matt Butler, Leona Holloway & Cagatay Goncu (Monash IT), Merrin McCracken (Deakin Disability Services) & Tom Perry (Monash Disability Services)
- Expert reference group: University of Adelaide, Vision Australia, Victorian Department of Education, DIAGRAM Center (USA), consumer representative
- External evaluator: Matt Brett (La Trobe)

Accessible graphics in HE

- OLT Project: "Improving vision impaired students' access to graphics in higher education"

- Stage 1: Information gathering
  - National survey of 71 VI students
  - Interviews with 42 Students, academics, disability services staff and accessible format providers

Findings – level of access

Vision impaired students lack access to graphics:

- 84% skip graphic materials of potential value because it is inaccessible
- 94% could benefit from improved graphics
- 50% avoided a potential area of study or career due to concerns about access
- Higher participation in Society and Culture (43% vs 24%)
- Lower participation in STEM (11% vs 24%)

Accessible graphics project continued

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Stage 2: Pilot studies

- Working with 8 students and their disability advisors, lecturers, tutors and accessible formats providers

Stage 3: Recommendations

- Workshop with participants and contributors to the project

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Principles

for improving VI access to graphics in HE

http://accessiblegraphics.org/research/principles/

1. Communication & shared responsibilities

1. Support for the learning requirements of vision impaired students requires **communication** and **shared responsibilities** between students, academics, support staff and specialist services.

- Roles and responsibilities must be understood and agreed to by all stakeholders.
- Foster effective and timely formal (and informal) communication processes between all stakeholders.
- Formal mechanisms are required to capture and distribute feedback regarding disability services.

2. Inclusive teaching strategies

2. Many of the learning requirements of vision impaired students can be addressed through **inclusive teaching strategies**.

- Improve disability awareness among academics.
- Encourage use of teaching strategies that improve accessibility and learning outcomes for *all* students.

3. Specific learning requirements

3. Vision impaired students have **specific learning requirements** for which higher education institutions are obligated to provide appropriate services and support.

- Students with disabilities require specialised support for transition to higher education.
- Vision impaired students require resources and skills to access materials independently. Universities should assist students in acquiring these.

4. Strategies for accessible graphics

4. Vision impaired students require further specialized support, including the use of **appropriate strategies for accessible graphics**.

- Consideration is given to the multiple roles that graphics play in the overall learning experience.
- Application of appropriate technologies and practices to make graphics accessible, as best suited to the individual student, content and context.
- Use national networks and partnerships to share expertise, best practice and resources and keep up-to-date with changes in technology and the teaching environment.

Applying the principles

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- Suggested strategies accompany the principles
- http://accessiblegraphics.org/research/he/principles/
- Workshops available to explore how to apply the strategies at your institution

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Identifying which diagrams need to be made accessible

Identifying which diagrams need to be made accessible – the problem

- Everything?
- Student request?

  "*I don't know what to ask for*"

  "It takes a lot to be able to stand up and say 'I've got this condition and I can't do it'"
- Lecturer?

  "I wouldn't want to go through and identify which graphics I think are needed ahead of time because … I could spend a lot of time worrying about something that [the blind student is] perfectly able to access already."
- Tutor?

Identifying which diagrams need to be made accessible – some ideas

- Recognise the importance of ALL graphics
- Student needs minimum level of information about diagrams so they can make a decision about which they need to access more fully
- Lecturer can identify which diagrams will be needed for assessment. These should provided in same format that will be used for the exam.

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Choosing a format

http://accessiblegraphics.org/formats/choosing/

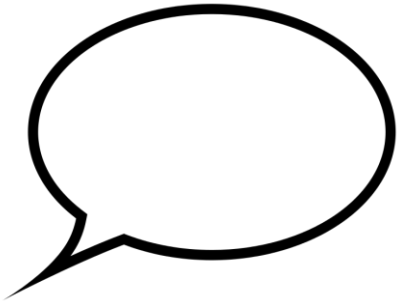
Enlargement

- Most common method for accessing graphics for students with low vision in HE
- Disadvantages:
  - Original needs to be good quality (high resolution and high contrast)
  - Difficult to get an overview
  - Can cause headaches and fatigue

screen magnification

Verbal descriptions

- Most common method for accessing graphics for blind students in HE
- Least preferred method for accessing graphics
  - Lecturers don't have time to give full descriptions
  - Students, family and friends are unable to give adequate descriptions
  - Does not foster or allow for independence



Enlargement and verbal descriptions are good starting points, but may need to be supplemented with other methods.

Written descriptions

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Advantages:

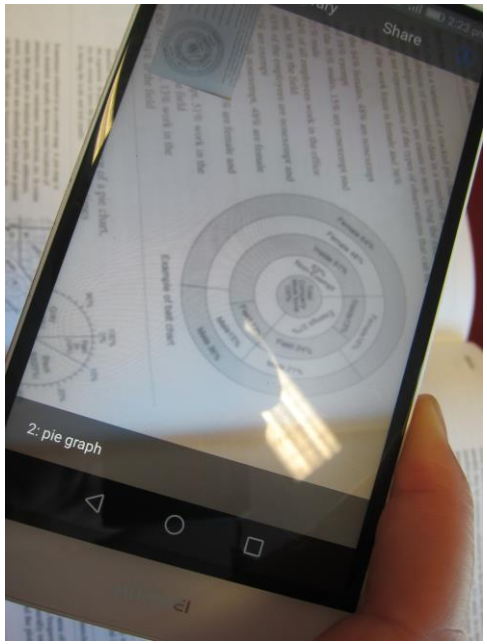
- allows for more independent study
- useful as accompaniment to other formats (enlargement or tactile graphics) to provide overview and assist with navigation
- can also be helpful for other students in the class

Overcoming difficulties:

- Subject matter knowledge needed – ask a tutor or follow an example written by the lecturer
- Links to training resources given at http://accessiblegraphics.org/formats/descriptions/

Image description apps

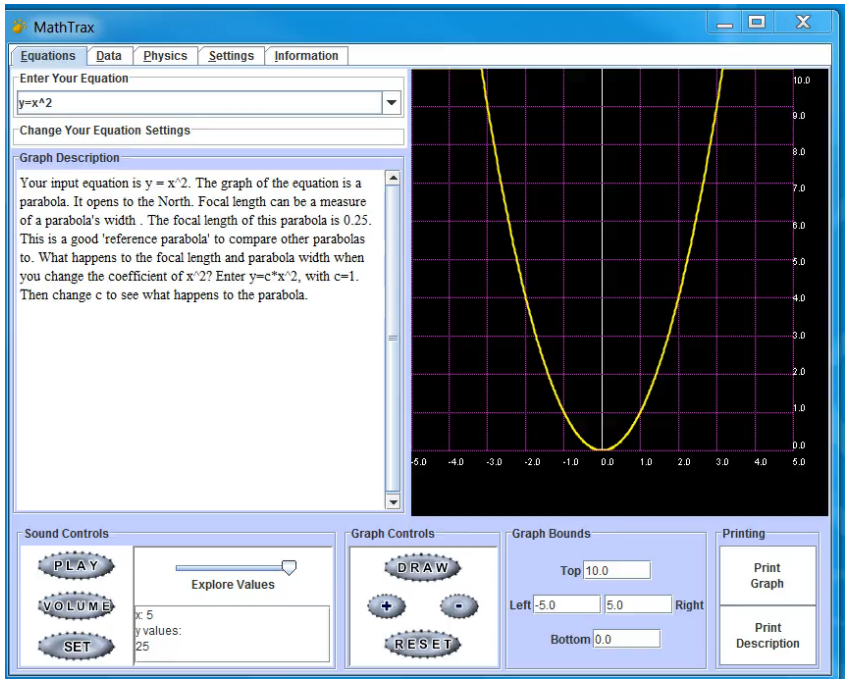
- Take a photograph and receive a brief description
- Advantages:
  - Instant and independent access
  - Gives an indication of type of diagram and whether further access is required
- Examples
  - TapTapSee http://taptapseeapp.com/
  - IRIS for maths and science content. Call for beta testers at www.grapheel.com



"pie graph" identified using TapTapSee

Sonification

- Data or equation converted to audio tones. Works best for line graphs.
- Advantages:
  - Independent and instant access
  - Does not require tactile literacy
- e.g. MathTrax by NASA



Statistics

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- R
  - The most accessible statistics package for navigation and use
  - BrailleR package provides descriptions of graphs and ability to automatically output graphics as tactile graphics
  - Information and Blind R Users Group (BlindRUG) email listserv available at https://www.nfbnet.org/mailman/listinfo/blindrug_nfbnet.org
- SAS Graphics Accelerator
  - Free add-in for SAS University Edition
  - Gives description, sonification and data
  - Works for all graphs created using SAS

GraVVITAS

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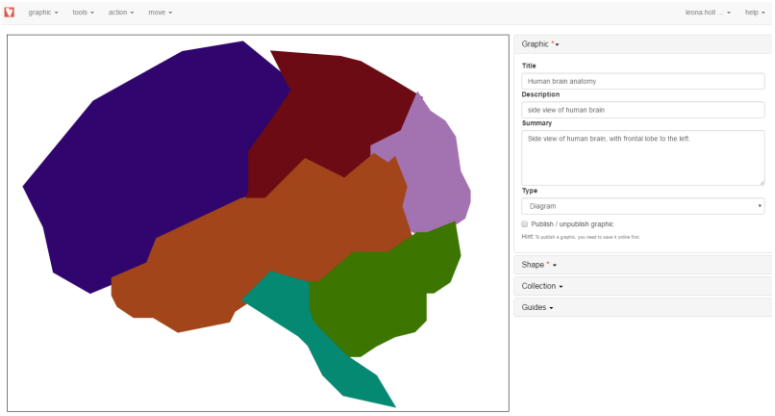
- Author tool to create simple graphics with associated audio tones and labels http://www.raisedpixels.com/graauthor/#
- Reader app by Raised Pixels from the App store
- Best suited to:
  - Diagrams with spatial component
  - Diagrams with lengthy labels
  - Quick in-house production
  - Students who do not want to use tactile graphics

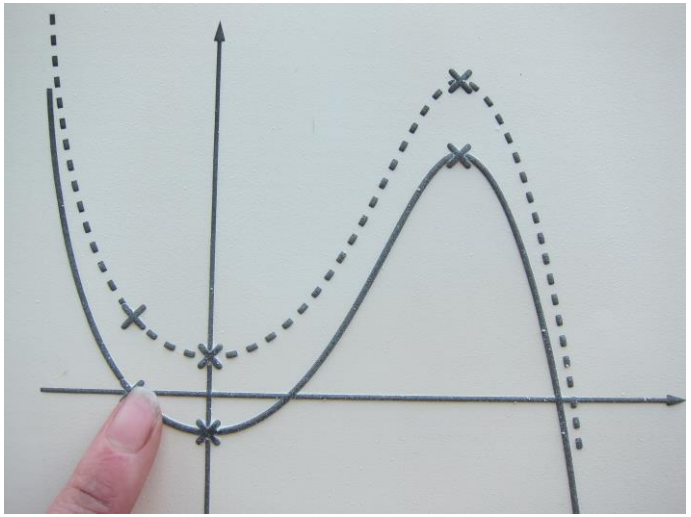


GraVVITAS Author tool

- Available for (free) use but still in development. Please contact cagatay.goncu@monash.edu

Tactile graphics

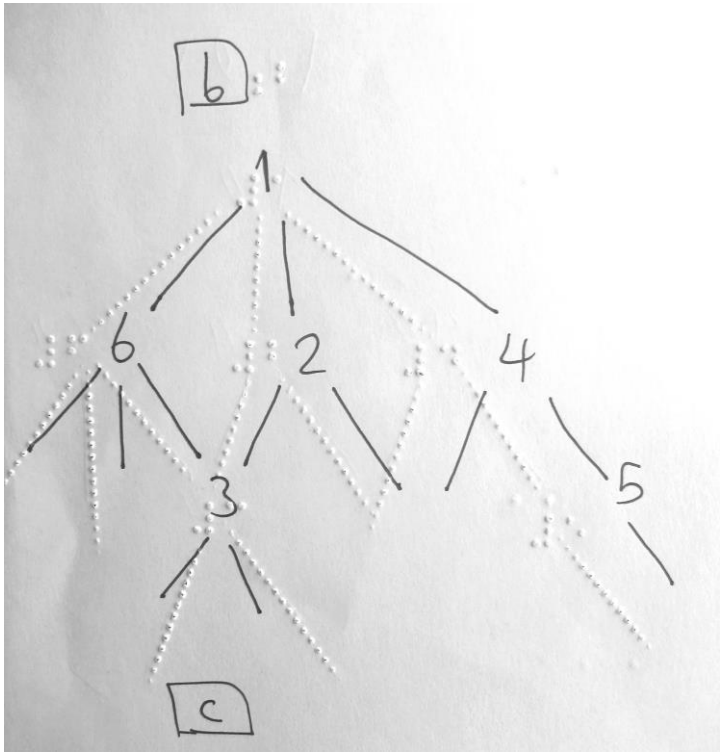
- Widely recognised as the ideal format for graphics with spatial information
  - Only required for around 5-10% of graphics
- Under-used
  - Only 30% of tactile literate students receive tactile graphics at university
  - Concern regarding tactual literacy
  - Concern regarding cost and time for production



tactile graphic

Tactile graphics – overcoming barriers

- If a tactile graphic will be used in the exam, give exposure to similar tactile graphics during semester
- Accompany with written or verbal description giving type of diagram and direction for reading to aid with navigation; and with labels for non-braille readers
- Quick handmade tactile graphics



handmade tactile graphic

3D models

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- Advantages:
  - More intuitive for blind students
  - Appealing and inclusive for all students
  - Becoming more readily available as pre-existing objects, open source models for 3D printing, or custom-designed for 3D printing

Population density of USA, represented in 3D

- Resources:
  - http://accessiblegraphics.org/formats/3d/
  - Upcoming workshop at 2017 Round Table Conference in Perth (May)

Summing up

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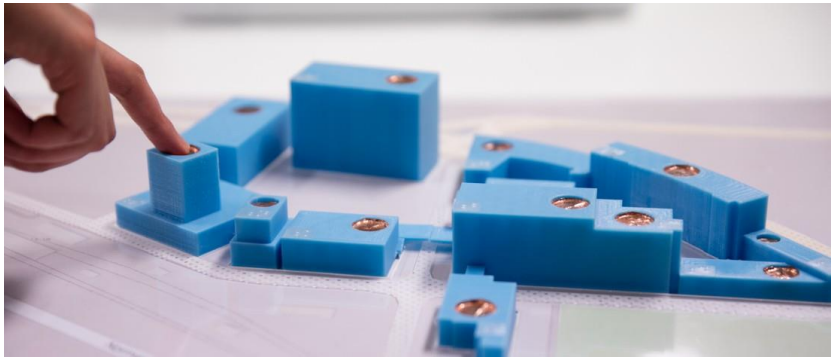
- Diagrams and graphics are an important component of access to learning and environment in higher education
- Provision of access to graphics does not need to be difficult
  - Match the strategy to the student and situation
  - Join communities and communicate to share expertise
  - Best practice is within reach
- Help students reach their true potential

"*Statistics was a very challenging unit for me and there were several hurdles along the way. I couldn't have achieved such a high result without the help from each of you"* – blind student to disability advisors, academics, accessible formats providers and the project team

For more information

- Butler, M., Holloway, L. M., Marriott, K. & Goncu, C. (2016). Understanding the graphical challenges faced by vision-impaired students in Australian universities, **Higher Education Research & Development**
- http://accessiblegraphics.org/he
- Contact us:
  - at Leona.Holloway@monash.edu, Kim.Marriott@monash.edu and Matthew.Butler@monash.edu
  - Available for local workshops, e.g. how to apply the principles for your circumstances
  - Interactive 3D campus models



3D map of Monash Caulfield with audio touch points