3D printing for tactile literacy – Survey and results

This survey is designed for educators working with vision impaired touch readers from Foundation level to Year 2.

**Instructions:** Please indicate your selected responses with an X in the next table cell. If you select “other”, please explain with text below the table. Your saved completed document should be emailed to [leona.holloway@monash.edu](mailto:leona.holloway@monash.edu) or mailed to   
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An online version of this survey is also available at <https://tinyrurl.com/access3Dsurvey>.

# Agreement

I have read the explanatory statement [below](#_Explanatory_Statement) and I agree to take part in Monash University research project 18075 investigating 3D printing to improve access to graphics by people with vision impairments.

|  |  |
| --- | --- |
| Yes |  |
| No |  |

# About you

## What is your work role?

|  |  |
| --- | --- |
| Specialist vision teacher (visiting/itinerant teacher) |  |
| Classroom teacher |  |
| Classroom aide |  |

Other:

## Location

|  |  |
| --- | --- |
| Australian Capital Territory |  |
| New South Wales |  |
| Northern Territory |  |
| Queensland |  |
| South Australia |  |
| Tasmania |  |
| Victoria |  |
| Western Australia |  |
| New Zealand |  |

Other:

## How many vision impaired students do you currently work with?

Number:

## How many of these students are in the first three years of schooling?

Number:

## Do you have access to a 3D printer?

|  |  |
| --- | --- |
| Yes |  |
| No |  |
| Unsure |  |

# Accessible materials for the classroom

For each of the following topic areas, please indicate what materials you are already using (“**Already using**”) and what other materials may be of value to your student (“**Wanted**”). “**Not needed**” indicates that your student does not need to study this topic area.

## Introducing braille cells

|  |  |  |
| --- | --- | --- |
| **Item** | **Already using** | **Wanted** |
| Not needed |  |  |
| muffin tray wth tennis ballshandmade representation of braille cell,  e.g. muffin tray with balls |  |  |
| [laser cut wooden tray with six dots for ping pong balls in the formation of a braille cell](childsply.wixsite.com/catalogue/product-page/braille-cell-model)purchased representation of braille cell |  |  |
| [braille fidget cube that can be twisted to form any braille cell](http://www.thingiverse.com/thing:159966)3D printed braille fidget cube |  |  |
| [swing cell with two rectangles, each with three holes for red pegs](http://www.thingiverse.com/thing:2704904)3D printed braille swing cell |  |  |
| [Tack-Tiles braille bricks](http://www.tack-tiles.com/)Tack-Tiles |  |  |
| [3D printed blocks resembling lego with braille dots on top](http://www.thingiverse.com/thing:2704961)3D printed braille bricks |  |  |
| [https://lh3.googleusercontent.com/UpVMxEqc8ikr6ekQrGIRpjVavkvmOD8MrGHS-w0CGzM0dKc48YIriGQd5sHzolsb5ckI_ArGoW6cHSFS9RgaXv0t4lLzF440S0wxTRmH8SVmWhunPJjOE6ou_kouwYbwEZI-P0HDk866Zlw](http://www.thingiverse.com/thing:1702802)3D printed braille building blocks |  |  |

Other:

## Story books

|  |  |  |
| --- | --- | --- |
| **Item** | **Already using** | **Wanted** |
| Not needed |  |  |
| Cat in the Hat print bookStandard print books read aloud |  |  |
| Cat in the Hat print book with braille overlayStandard print books with braille added |  |  |
| braille bookBraille books without illustrations |  |  |
| dreaming fingers book with braille and collage pictureTactile story books with braille and tactile illustrations |  |  |
| https://lh3.googleusercontent.com/Ump6fT1GTnyQFuTdMVu9sxpfd1y_AwPE9CgDvLE_ZJLM5mtFowcgJ9msce3gj13Y2KPw4J6_btU7Dzm05pTDe9dyY90IJ0lLZ-HCUrF8P684DzyJ0YyCYXcxKPzF-28BTGi0fc4SveMyRUETactile story boxes containing items relating to the story |  |  |

Other:

## MAB blocks

|  |  |  |
| --- | --- | --- |
| **Item** | **Already using** | **Wanted** |
| Not needed |  |  |
| MAB blocks for single units, ten and 100. Standard MAB blocks |  |  |
| Purchased frames for counting with standard MAB blocks |  |  |
| [3D printed MAB blocks with raised lines](http://www.thingiverse.com/thing:3648003)3D printed accessible blocks with raised lines |  |  |

Other:

## 5/10s frame

|  |  |  |
| --- | --- | --- |
| **Item** | **Already using** | **Wanted** |
| Not needed |  |  |
| tens frame grid for puff paperTactile graphic |  |  |
| Handmade tactile grid |  |  |
| [laser cut wooden tray with 5 x 5 grid](childsply.wixsite.com/catalogue/product-page/extended-maths-kit)Purchased tactile grid |  |  |
| 3D printed frame |  |  |

Other:

## Objects for counting or building patterns

|  |  |  |
| --- | --- | --- |
| **Item** | **Already using** | **Wanted** |
| Not needed |  |  |
| tub of coloured plastic bearsStandard classroom objects, e.g. counters, pop sticks, plastic bears, beads, lego bricks, sticky back foam shapes, etc. |  |  |
| [wooden tiles with raised shapes](childsply.wixsite.com/catalogue/product-page/tactile-shape-counters)Additional objects with clear tactile differences, e.g. mixed pasta, bottle tops, tactile shape counters, etc. |  |  |
| [3D printed pokemon](https://www.thingiverse.com/thing:2271264)3D printed objects to suit the student's interests |  |  |

Other:

## Dice

|  |  |  |
| --- | --- | --- |
| **Item** | **Already using** | **Wanted** |
| Not needed |  |  |
| [tactile dice](shop.visionaustralia.org/shop/product/brailled-dice-set-2-dice)Commercially available tactile dice |  |  |
| [tactile dice](http://www.thingiverse.com/thing:2704808)3D printed tactile dice |  |  |

Other:

## Dominos

|  |  |  |
| --- | --- | --- |
| **Item** | **Already using** | **Wanted** |
| Not needed |  |  |
| Standard domino with braille or tactile dots added |  |  |
| [dominos with raised dots](shop.visionaustralia.org/shop/product/dominoes-double-6-raised)Purchased tactile domino set |  |  |
| [model for dice with raised dots](http://www.thingiverse.com/thing:3671231)3D printed tactile domino set |  |  |

Other:

## Number lines

|  |  |  |
| --- | --- | --- |
| **Item** | **Already using** | **Wanted** |
| Not needed |  |  |
| simbraille number lineBrailled number lines |  |  |
| number lines for swell paper diagramTactile graphics |  |  |
| [kit of paper number lines with clear print and raised lines](shop.aph.org/webapp/wcs/stores/servlet/Product_Consumable%20Number%20Lines_2649137P_10001_11051)Purchased accessible number lines |  |  |
| 3D printed number line and skip counting pieces3D printed number line |  |  |

Other:

## Measurement

|  |  |  |
| --- | --- | --- |
| **Item** | **Already using** | **Wanted** |
| Not needed |  |  |
| Standard tools with tactile markers added | 2 |  |
| [wooden tactile ruler](childsply.wixsite.com/catalogue/product-page/30cm-rule%20and%20childsply.wixsite.com/catalogue/product-page/tactile-protractor)Purchased accessible tools | 1 |  |
| [model for 3D printed ruler with tactile markers and handle](medien.augenbit.de/lineal-20-cm/?lang=en)3D printed ruler with tactile markers |  | 2 |

Other:

## Fractions

|  |  |  |
| --- | --- | --- |
| **Item** | **Already using** | **Wanted** |
| Not needed |  |  |
| https://lh5.googleusercontent.com/NIjVFbDGMPH7S4i6qvKPbxOAq2aihTpxVZUZjProjQXWufFcs0dG9wbKvAprZzmo3Z9lFjzqKjRrc5gjD81Fuk8HksluG_tF3zT_Keq9ATT8z4MdqbAO3drRScM5OkEpHTFZIiFoJrNC3ZYTactile graphics |  |  |
| fraction pies with print labelsStandard materials, e.g. wooden cake in slices, fraction pies, etc. |  |  |
| [kit with fraction pies and fraction bars](https://shop.aph.org/webapp/wcs/stores/servlet/Product_MathBuilders,%20Unit%207:%20Fractions,%20Mixed%20Numbers,%20and%20Decimals%20Kit_22101248P_10001_11051)Purchased accessible fraction tools |  |  |
| [3D printed fraction pie with braille labels](https://www.thingiverse.com/thing:183108)3D printed accessible fraction tools |  |  |

Other:

## Flat shapes

|  |  |  |
| --- | --- | --- |
| **Item** | **Already using** | **Wanted** |
| Not needed |  |  |
| circle, square, rectangle and oval for swell paper diagramTactile graphics |  |  |
| triangle, square and circle cut from flat circleHandmade tactile flat shapes,  e.g. cut from cardboard or foam |  |  |
| tub of plastic pattern blocksPurchased flat shapes |  |  |
| https://lh6.googleusercontent.com/I6dVEYPWdhWvJezMj4am2rekAKr4vSYdxTvvsCo8yJoL-UhdnNCsUA1E8PKHx66pU4wI4cCojd1rm45GT1OWzdt5EX3V48-NV04cS5rs1laXPkwgWLiBOAaSYINNMvlxRbrqQdCIZG_timk3D printed flat shapes |  |  |

Other:

## 3D shapes

|  |  |  |
| --- | --- | --- |
| **Item** | **Already using** | **Wanted** |
| Not needed |  |  |
| cube with dotted line projections for swell paper diagramTactile graphic with projections |  |  |
| 3D shapesPurchased 3D shapes |  |  |
| [3D shapes](http://www.thingiverse.com/thing:1533760)3D printed 3D shapes |  |  |

Other:

## Nets

|  |  |  |
| --- | --- | --- |
| **Item** | **Already using** | **Wanted** |
| Not needed |  |  |
| diagram of nets for swell paperTactile graphics |  |  |
| nets made with cut-out paperHandmade nets |  |  |
| plastic foldable nets with clear containersPurchased nets |  |  |
| [3D printed foldable nets](http://www.thingiverse.com/thing:2044034)3D printed nets |  |  |

Other:

## Clock time

|  |  |  |
| --- | --- | --- |
| **Item** | **Already using** | **Wanted** |
| Not needed |  |  |
| swell paper diagram of clock with braille numbers and movable clock handsTactile graphics |  |  |
| learning clock with movable handsstandard clock or learning clock with tactile labels added |  |  |
| [clock with movable hands and raised indcators for minutes and hours](https://shop.aph.org/webapp/wcs/stores/servlet/Product_Analog%20Clock%20Model_38263193P_10001_11051%20or%20childsply.wixsite.com/catalogue/product-page/copy-of-a-ticking-braille-clock)accessible clock or learning clock |  |  |

Other:

## Data grids

|  |  |  |
| --- | --- | --- |
| **Item** | **Already using** | **Wanted** |
| Not needed |  |  |
| [swell paper grid with markers](http://www.duxburysystems.org/downloads/gp/index.htm)Tactile graphics |  |  |
| [wooden tray with label and pattern tiles](childsply.wixsite.com/catalogue/product-page/extended-maths-kit)Purchased accessible data grid |  |  |
| [3D printed carteisan coordinates grid](http://www.thingiverse.com/thing:2143865)3D printed data grid |  |  |

Other:

## Maps

|  |  |  |
| --- | --- | --- |
| **Item** | **Already using** | **Wanted** |
| Not needed |  |  |
| swell paper diagram for floorplan with braille labelsTactile graphics |  |  |
| collage map of a park Handmade tactile maps,  e.g. using spur wheel, wikki stix, collage |  |  |
| lego map of a room Handmade 3D maps,  e.g. using blocks, lego or classroom props |  |  |
| [Ballyland characters and landscape features in a grid](http://www.sonokids.org/ballyland-early-learning/)Ballyland Code app with 3D printed props |  |  |
| [simple 3D printed street with buildings](https://touch-mapper.org/en/)3D printed maps |  |  |

Other:

## Animals

|  |  |  |
| --- | --- | --- |
| **Item** | **Already using** | **Wanted** |
| Not needed |  |  |
| picture braille image of a dogTactile graphics |  |  |
| https://lh6.googleusercontent.com/X0QyMiogWBqDs_c46vMUGor4X4NjyOo1AvsMbLIbYD7UO4yX1V6NZFHUbalxWkFNs-qVEvzPsQCOzGgMdbgjBGeBHm1ZFzcQRlGTpjKoTGS-EcrUQbEwCQf5YMPA18QrtOpiTO-bP_ONoGQPurchased toy animals |  |  |

Other:

## Additional materials

Used:

Wanted:

# Priorities when choosing classroom materials

How important are each of the following factors when choosing classroom materials for vision impaired students?

1 = not at all important

5 = extremely important

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Consideration** | **1** | **2** | **3** | **4** | **5** |
| Cost |  |  |  |  |  |
| Convenience – the materials are already in the classroom for use by sighted students |  |  |  |  |  |
| Tactile properties – the materials are easily distinguished by touch and appealing to the student |  |  |  |  |  |
| Storage – the materials do not take up too much extra storage space |  |  |  |  |  |
| Readiness – the materials can be sourced quickly |  |  |  |  |  |
| Staff time – the materials do not need to be prepared by school staff |  |  |  |  |  |
| Environmentally friendly – the materials can be recycled or re-used |  |  |  |  |  |
| Inclusion – the materials can also be used by sighted peers |  |  |  |  |  |

# Your contact details

Please provide your email address if you are located in Australia or New Zealand and you are interested in receiving and testing some of the 3D printed materials that you indicated would be of value to your student(s).

Email:

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# Explanatory Statement

You are invited to take part in this study. Please read this Explanatory Statement in full before deciding whether to take part in this research. If you would like further information regarding any aspect of this research, you are encouraged to contact the project investigators using the details listed below.

### WHAT DOES THE RESEARCH INVOLVE?

This project aims to transform the provision of accessible graphics within Australia by exploring 3D printing as a new method for conveying graphics through touch.

Monash University is partnering with the Victorian Department of Education & Training, RIDBC, SPEVI and others to investigate the use of 3D printed models for teaching tactile literacy and STEM to children who are blind or have low vision. You are invited to complete this survey to help identify models that may be helpful in the classroom.

### WHY WERE YOU SELECTED FOR THIS STUDY?

Group 1: You were selected for this study as you are a specialist teacher or aide working with students with vision impairment through one of the project partner organisations: The Department of Education and Training Victoria, Royal Institute for Deaf and Blind Children, or a member of South Pacific Educators in Vision Impairment.

### CONSENT AND WITHDRAWAL

Participation in this study is entirely voluntary.

Participation in this study is not a workplace requirement. You may use the 3D printed materials being offered without participating in the study. Your inclusion or exclusion in the study will be known only by the researchers; not by your workplace managers or colleagues.

### SOURCE OF FUNDING

This research is funded by the Australian Research Council (ARC) Linkage Project LP170100026, with support from the Department of Education and Training Victoria, Round Table on Information Access for People with Print Disabilities, Inc., South Pacific Educators in Vision Impairment, Royal Institute for Deaf and Blind Children, Guide Dogs Victoria and the Royal Society for the Blind.

### POSSIBLE BENEFITS

The project aims to benefit the low vision community by supporting the use of 3D printed models for improved access to graphics.

### POTENTIAL RISKS

This research involves minimal risks.

### CONFIDENTIALITY

Your participation in this study will not be made known to others and your details will remain confidential.

Results will be published in aggregated form so that individual participants cannot be identified.

### STORAGE OF DATA

Data relating to the project will be retained for a minimum of five years, in accordance with research requirements. The raw data will be stored in a secure location able to be accessed only by the research team.

After it is no longer required, all data will be destroyed in a secure manner.

### RESULTS

Results of the study and overall project will be published through academic and professional journals and conferences, and be used to form the basis of guidelines to be published by Round Table.

Notification of publications will be made available at accessiblegraphics.org and results will be made available on request.

### COMPLAINTS

Should you have any concerns or complaints about the conduct of the project, you are welcome to contact the Executive Officer, Monash University Human Research Ethics (MUHREC):

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