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Making resources accessible to visually impaired students

Karen and Ellie suggest ways of making the text and illustrations in geography resources accessible to students with visual impairments, in line with best practice guidelines.

Geography resources and assessment materials frequently contain maps, photographs and other visual information which may render them less accessible to students with visual impairments. While students with serious visual problems will have access arrangements in place to ensure that they can use exam papers (e.g. increased typeface or Braille papers), there is a subset of students with low vision, colour blindness and dyslexia who will benefit from clear and accessible presentation of visual material in standard exams and resources. Though the colour blind are able to use 'colour namers' in examinations, careful consideration of their needs in classroom assessment has the potential to reduce self-consciousness and the need for additional support.

This article provides information about selecting visual materials and designing geography resources and assessments according to best practice guidelines (see JCQ, 2012; Ofqual, 2010; RNIB, 2011). It recommends that, once a visual resource has been established as pursuant to the aims of learning and/or assessment, visual accessibility is maximised in terms of the images chosen and the means by which they are presented. Teachers may wish to use some of the ideas presented here to assist them with the development of geography resources for students with visual impairments.

Low vision, colour blindness, and dyslexia

Students who may benefit from the clear presentation of visual information include those with low vision, colour blindness and dyslexia. While in themselves these are distinct visual issues, there are a number of measures that can be taken to increase the accessibility of resources across these groups.

Low vision is experienced by someone who has reduced capacity to see following the best-possible correction. Low vision is often defined in terms of visual acuity (how well you can see contrast in the centre of your vision) but encompasses a very broad range of visual issues, for which students affected to varying degrees most likely will have developed a range of strategies for approaching printed materials.

Dyslexia can be associated with visual disturbance or discomfort when reading print. This affects around 35–40 % of dyslexics, who may experience one – or several – of the following:

- blurred letters, or words which go out of focus
- letters which move or present with back-to-front appearance, or as if shimmering or shaking
- words or letters which break into two and appear as double
- difficulty with tracking across the page
- disturbance due to glare on the page, or oversensitivity to bright lights.

(Adapted from British Dyslexia Association, 2013.)

People with dyslexia will generally find it easier to read large, widely spaced print, than that which is small and crowded, and their reading speed will improve with a larger text size (O'Brien, Mansfield & Legge, 2005). While many students will be aware of their dyslexia, it has been observed that very bright children are able to compensate for it (Marshall, 2004).

Colour blindness, or colour vision deficiency (CVD), causes certain ranges of colour to be difficult to distinguish. It affects approximately 4.5 % of the population in Britain, the majority of whom are male (Colour Blind Awareness, 2014).

The most commonly occurring forms of CVD affect red or green colour perception, although the impact is similar. Students with CVD are less likely to distinguish between colours of similar lightness, hue or saturation.

There are various web tools available for simulating how images will appear for people with each type of colour blindness. For example, Etre (2014) has a free-to-use colour blindness simulator which will process small digital images.

Ensuring accessibility of print-based resources

The legibility of text is not just size-dependent, but also quality-dependent. The list below outlines some key recommendations made by RNIB (2011) to help increase the legibility of printed materials.

- **Spacing between letters, words, lines and illustrations:** Leave space before and after paragraphs and illustrations; if students have to write on the resource, allow extra handwriting space for the visually impaired. Spacing between lines of text should be at least 25–30 % of the point size. This is because many people with partial sight have difficulty finding the beginning of the next line while reading.
- **Font type:** In general, use a clear font such as Helvetica, Arial, Tahoma or Tiresias; avoid light or curved fonts; avoid mixing font types in the same resource. Roman typefaces and sans-serif typefaces are effective. Italic, decorative or condensed typefaces are not as effective.
- **Formatting and justification:** Avoid italics and underlining; do not use upper case letters for continuous text; left justify text.

- **Paper quality:** Avoid glossy paper as this can cause glare.
- **Page layout:** Keep page design clear and uncluttered; keep drawings, tables and graphs as simple as possible.
- **Contrast between print and background:** Try to use black text on a cream or white background; if using coloured print and backgrounds make the colour contrast as strong as possible; avoid putting text over illustrations.

Ofqual (2010, p. 36) gives a number of general recommendations regarding the presentation of charts and diagrams:

- present diagrams, charts and graphs in a familiar format, unless interpretation of novel formats is the focus of assessment. Sharp contrast, clear definition and sufficient resolution help important information to be easily identified
- use diagrams, charts and graphs which lend themselves to being enlarged for visually impaired learners
- avoid unnecessary information in diagrams, pictures or photographs. This will help learners to identify the relevant information
- label significant features using keys, rather than lines and arrows, where possible
- present tables with clearly separated columns.

Additional recommendations made by Okabe and Kei (2002) for creating charts that are accessible for people with CVD include:

- try not to rely solely on colour to convey information. Instead, use different line styles, hatching patterns for bars and pie slices, and easily distinguishable symbols to show differences in information. Keep the number of colours to a minimum
- separate reds from greens, and blues from violets. These colours are difficult to distinguish. If they must be next to one another, separate by a white line for contrast (see Figure 1)
- try not to use red to emphasise information. This colour appears dark and dull to most people with CVD. Red text will not stand out well next to black text, for instance.

With regard to colour coding and the use of keys, greyscale may often be the most straightforward means of ensuring a chart is more accessible for people with CVD. For example, in comparing the two pie charts shown in Figure 2, the 'slice of the pie' which refers to the Pacific Ocean and which to the Atlantic Ocean in the coloured pie chart below will not be as obvious for a colour-blind person as the greyscale chart.

Diagrams and photographs

When selecting images choose ones with high contrast. In depicting information diagrammatically, including clear black lines around the features of interest and selecting highly contrasting colours will help aid visual accessibility (Figure 3).

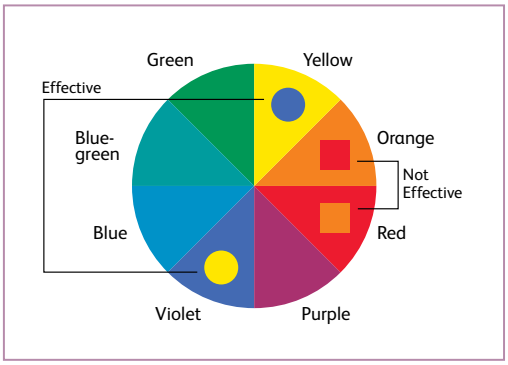

Figure 1: Illustration of effective and less effective colour combinations for achieving contrast. **Source:** Arditi (1999a) ©2005 Lighthouse International.

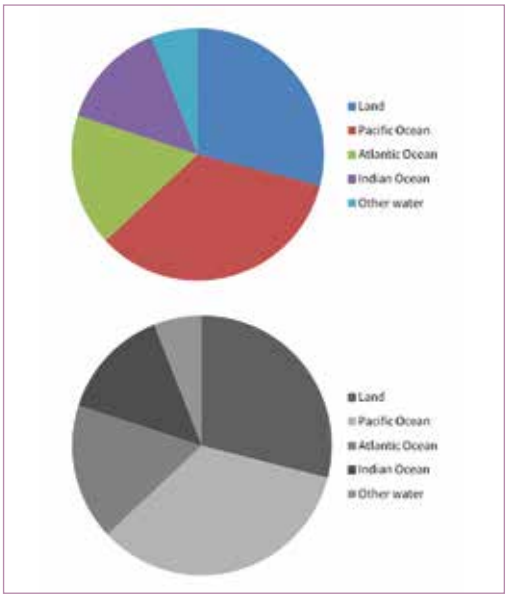

Figure 2: Comparison of colour and greyscale pie charts showing the coverage of the Earth's surface.

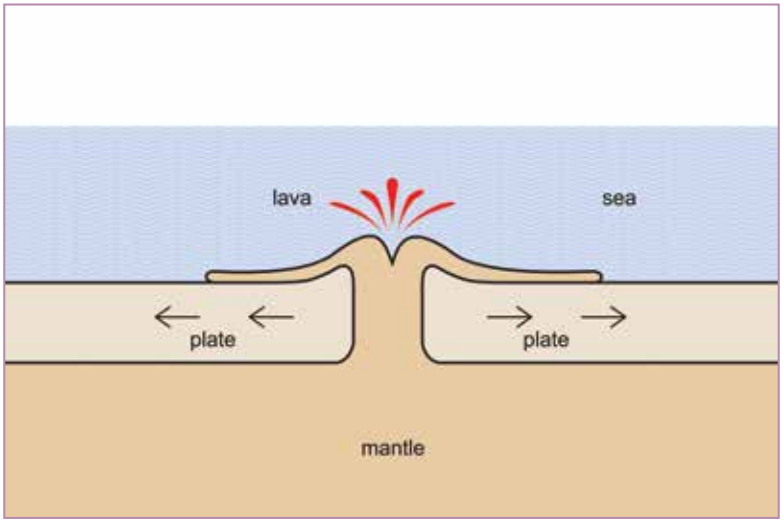

Figure 3: Simple diagram of a constructive plate margin. **Source:** RNIB.

Ordnance Survey maps

Guidelines from the JCQ (2012) produced in conjunction with the RNIB indicate that the 'standard' format of Ordnance Survey (OS) maps is too difficult for students with visual impairments to tackle effectively. They offer options for assessing individual skills:

- 4- and 6-figure grid references
- contour lines to give an indication of steepness of slope
- measuring straight and curved line distances
- use of compass points

Figure 4: OS map with (right) and without (left) the augmented colour scheme. **Source:** Ordnance Survey (2011).

- appreciation of relief, so that the student can identify simple topographies, illustrating with a written response rather than with a drawing, e.g. a hill, a valley, a plateau. (Cross-sections present major practical difficulties, disproportionate to the number of marks allocated)
- identifying various types of land use in urban and rural areas
- elementary route finding (networking). These skills would need to be tested separately on individual diagrams
- identifying map symbols to show understanding of the key.

Additionally, where the use of OS maps is essential, JCQ (2012) make the following suggestions:

- provide a modified version of the original extract for orientation
- provide individual modified enlargements of specific parts of the original extract, depending on the questions
- if the question requires the use of scale, a new linear scale should be displayed on the same page as the extract
- the shadings and symbols on the maps should be in line with the guidance set down by the RNIB/VIEW Geography Curriculum Group.

There is not very much that can be done to change the presentation of OS maps without undermining the authenticity of the source. Nonetheless, research developments promise that – in the future – OS maps will be more accessible, at least for people with CVD. The colour schemes under development by the OS aim to aid the visibility of certain features on an OS map (see the colour-optimised map in Figure 4).

Summary

This article has described some of the ways in which geography resources can be presented to achieve clear visual presentation. The key recommendations highlight the benefits of using a clear and consistent font with strong contrast between lettering/images and backgrounds, the need to leave plenty of space around text and diagrams, and not to rely on colour as the sole means of conveying information. It is also considered beneficial to avoid printing on glossy paper, to reduce possibility of glare causing visual interference. Following these recommendations should increase ease of reference for all students. | **TG**

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