

Designing a website for dyslexic students in art and design

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Abstract

The paper presents the progress, to date, of an ongoing project to provide a flexible online resource for dyslexic students in art and design. The principle aim is to encourage discussion and feedback on key aspects of the research and resulting online design. The paper introduces the theory behind the design, incorporating reference to learning styles, studies of online accessibility, recent research into dyslexia and visual impairment, and the direct use of student feedback. The theory has been applied as a set of key design principles which have informed the graphics, visual layout and technical features of the website. Students have provided advice on content as well as design. The key design principles are outlined and examples from the website are provided to illustrate their application. Reference is also made to intended content. An additional section has been appended to the original paper, outlining the intentions of the research team subsequent to the conference.

Introduction

Relatively high levels of dyslexia are widely accepted as characteristic of the student body in schools of art and design. The two key studies

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which provide sound research data to support this assertion are those by Steffert (1999) and Wolff and Lundberg (2002) but available estimates of percentage levels seem to vary from c.10 per cent + (Brigden, 2001) of the art and design population to the much higher figure of c. 30 per cent (Steffert, 1999), dependent on the type and degree of dyslexia being measured.

A website for students with dyslexia at Gray's School of Art, was initially suggested as an effective device for providing and supplementing support services at the Robert Gordon University. One-to-one support for these students is currently offered but staffing is limited and subject to demand from all faculties. However, we are now tentatively investigating the potential for national collaboration on the website, given that there are benefits to be offered by pooling existing resources. Our research to date indicates that no such specialised online resource currently exists, but that well-researched and relevant materials, specifically directed at the art and design sector, do. Two examples are the London Institute publication *Dyslexia. A Guide for Staff* (McKissock, 2001) and Glasgow School of Art's *Understanding Dyslexia* (Hammond & Hercules, 2000). The intention of this paper, therefore, is to seek feedback on the design of the initial site and to assess whether there would be further interest from the sector in possible collaboration.

Design of the website

The project was initiated in 2002, with funding provided by ADC-LTSN. Within the Robert Gordon University, the project involves internal collaboration between staff at Gray's School of Art and the Dyslexia Support Tutor from the University Study Support Facility. Two principle questions emerged from the early research concerning how to design the website and what to include in it? It was clear that no written materials could be appropriately designed without first considering the implications of dyslexia for online accessibility. Therefore, initially the focus has been on how to design and the issue of what to include has remained secondary. The paper therefore primarily covers issues of accessibility but brief reference will be

made to content. It is emphasised, at this stage, that all current aspects of design and content remain subject to student and peer feedback and a process of ongoing review.

Research basis for the online design

The issue of dyslexia and the online environment involved us in more than one area of research. Initially, we sought existing research on the topic of dyslexia and online accessibility. We were also interested in theories of dyslexia and current research into dyslexia and learning styles. A further concern that emerged was the known incidence of visual stress in dyslexia, resulting in a visit the Department of Vision Sciences at Glasgow Caledonia University, to meet Nadia Northway, a postgraduate student then undertaking doctoral research specifically within this area.

Early research indicated that the principal sources of information on disability and online design provided sound general advice but that there was a shortage of in-depth material specifically relevant to dyslexia. This situation is now much improved (see existing research) but initially we concurred with a study (Beacham, Alty & Szumko, 2003, p. 7) undertaken at Loughborough University, which stated:

Whilst guidelines on accessibility and pedagogy do now exist to help developers produce e-learning materials for dyslexic students, they tend to be general in nature, independent of the learning context and do not guarantee accessibility, engagement and inclusivity for everyone.

It was therefore decided at an early stage, to place Gray's own dyslexic students at the centre of our study to ensure that all online designs would be supported by practical testing and student feedback. This had the additional advantage of ensuring that the final site designs would be relevant to an art and design context.

A summary of our findings in respect of each of the above areas of enquiry follows and it is this that provides the basis for the key principles of design.

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Theories of dyslexia

A review of current theory on dyslexia immediately indicates that there are clear implications for online design. The theory is extensive and approaches differ but these can arguably be described as negative or positive. Negative does not imply a value judgement but describes an approach which focuses essentially on the difficulties and/or lack of skills in some defined area. In contrast, the positive centres on identifying potential strengths in the learning style.

Deficit definitions

All negative or 'deficit definitions' (Mortimore, 2003, p. 49) of dyslexia appear to emphasise some type of deficit in biology, behaviour or cognitive ability. Mortimer groups these into four principal categories:

1. *Phonological skills*; involving awareness of the phonological component parts of words (e.g. d-o-g). Difficulty in recognising phonemes leads directly to a range of problems with reading, spelling and the spoken word.
2. *Visual recognition and processing*; problems vary but the outcome is that letters and words may blur, move, or form patterns.
3. *Automaticity*; related to some skills, such as reading and writing, that should become automatic. Problems can affect both reading ability and processing speed.
4. *Short-term memory*; problems affect organising, structuring and sequencing skills, which can cause difficulty retaining the sense of large tracts of text, but which specifically has implications for online navigation.

Deficit definitions of dyslexia therefore have clear implications not only for the design of written or spoken information online, but for overall navigation within any final structure. The issue of short-term memory is of particular relevance and interest given that discipline specific research has been undertaken which highlights distinctive problems in this area, in art and design students.

Problems with short-term memory were highlighted in a discipline specific study (Padgett & Steffert, 1999, p. 18 and p. 157) in 1996 involving 360 foundation year art and design students, at Central Saint Martins in London. Steffert concluded that approximately 30 per cent of the students exhibited problems of a dyslexic nature at the syntactical, rather than phonological level, of language. She theorised that problems at this level involved poor working memory, affecting students' ability to engage with long or complex sentences or sections of text. As a subject specific study, this finding places additional emphasis on the careful design of text and use of language in the site.

Dyslexia and learning style

The alternative or 'positive' approach to dyslexia is based in current research into dyslexia and learning style (West, 1991; Steffert, 1999; Mortimore, 2003). This body of thought emphasises strengths and abilities in the learning profile, as opposed to disabilities, and aims to improve teaching and learning through appropriate application of that knowledge. A prevalent view is that individuals with dyslexia exhibit a dominant learning style usually described as visually based and holistic. Related advice states that the dyslexic individual will prefer 'to consider the whole task and then tackle the parts' and that 'the use of imagination, visualisation, 3D, patterns and colours can enhance learning' (Corrigan & McKissock, 2001, p. 13). Although well-accepted within art and design education, much of the supporting evidence for this view remains anecdotal and is reliant on self reporting (Brigden, 2001; Kiziewicz, 2000; Mortimore, 2003). More practical research is needed. Only Steffert's study (1999) offers sound evidence from psychological testing and it is notable that a recent and comprehensive text by Tilly Mortimore, *Dyslexia and Learning Styles* (2003, pp. 94-5), advises caution. Although Mortimore accepts that there is 'some evidence that dyslexic students may tend towards: [a characteristic] wholistic (sic) or imaging style', she places a distinct emphasis on the existence of individual differences and also stresses the need for further research.

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In brief, therefore, the implication for the website is that the overall design must recognise the possibility of a dominantly visual and holistic learning preference but that individual differences must also be acknowledged and that choice and flexibility must be provided.

Existing research: dyslexia and online accessibility

As already stated, research at the outset of the project, indicated that much of the information available on online accessibility, was general rather than specific to dyslexia. Key resources first consulted in October 2002 included the TechDis and Aberdeen University Learning Technology Unit websites. The TechDis website continues to be an important resource. Of direct and specific relevance is the work of Peter Rainger on accessibility and dyslexia, which is periodically updated and increasingly comprehensive. However it is our view that more practical research, directly involving feedback from students with dyslexia, is now required. Related studies are currently being carried out at Edge Hill College in Lancashire (Blankfield, Davey & Sackville, 2004) and reports of these are available online, but these are not specific to a particular discipline.

In summary, we consider that our current approach is in line with key recommendations to date, and we particularly concur with Rainger's final statement from his latest report (2004) recognising:

... the need for tutors and developers to be aware of the diversity of perceptions of content, learning styles, cognitive limitations and learning strategies. They need to build in alternatives for both the visual presentation and in the mode and medium of the learning material.

Using student feedback

Our conclusion, therefore, is that there is relatively limited evidence-based research within art and design education, into both the issue of dyslexia and learning styles, and dyslexia and online design.

Consequently, it continues to be important to seek regular student feedback on all aspects of the site and the intention is to carry out further research into both of these issues. All advice gained from student feedback to date is summarised on the ADC-LTSN website

(Samiei & Scott, 2003) and key elements are incorporated within the discussion of the design principles, below.

Dyslexia and visual stress

Finally, the initial research indicated that the incidence of visual stress within the dyslexic population constituted a significant issue. Nadia Northway of the Department of Vision Sciences in Glasgow, reported that at least 50 per cent of all dyslexics experience some degree of visual stress, while Beacham and Szumko (2003, citing Evans, 2001) state that the 'majority of people who are dyslexic will experience some visual difficulties'. Advice gained from the Glasgow visit (Scott & Samiei, 2003) therefore remains a core consideration in the design of the site and the key elements are, again, summarised on the ADC-LTSN website and incorporated within the discussion below.

Resulting design principles and their application within the site

The application of the above research is therefore now apparent within the design principles. These subdivide into seven key areas as follows:

- content – subject topics;
- navigation;
- text and font size;
- colour;
- audio options;
- use of language;
- use of images

Content – subject topics

The current subject topics were the result of testing and discussions with staff-student consultative groups. In initial discussions students ranked Time Management and Memory Techniques as the two most valuable topics.

The final nine main topic areas in the overall site map are listed below, and each contains two to five sub-topics with further sections in each (a tenth option enables users to contact the research team).

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- Being Dyslexic
- Writing in Art & Design
- Memory and Organisation
- Helpful Software
- Studio
- Links
- Lectures and Seminars
- Reading and Research
- Info for Staff

In total, there are over 60 resulting sub-sections to complete. The current sitemap is available at <http://filemaker.rgu.ac.uk/ispace/ismap/index.htm>

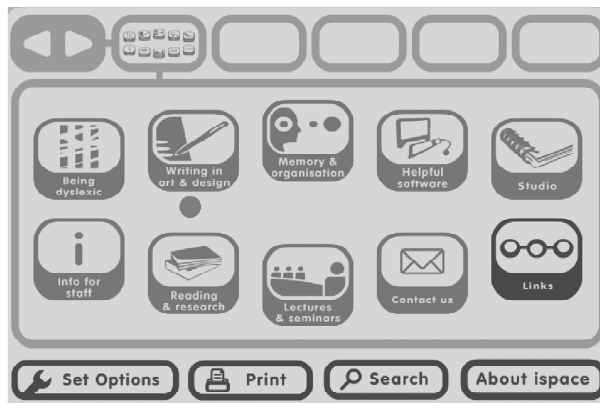


Figure 1 Prototype screen displaying top-level content

Addition of new or existing content

The addition of content is not a straightforward task. All content will need to be reviewed and transformed to ensure it is accessible and applicable to an art and design context, and much will need original development. For example, general study support advice is available, but will need to be transformed to meet the specific needs of the art and design student. The role of writing in art and design education is a case in point. It is currently evolving and it is not always the standard approach to essay writing, that is required. Some materials do currently exist which have been designed for an art and design context, but these will need to be reviewed to ensure their

accessibility. Contact has recently been made with the London Institute over a key text by Charmaine McKissock (2001) which will be incorporated into the site.

Navigation

As indicated, the ability of students with dyslexia to navigate through a website can be impaired as this can often require good recall and sequencing skills. Navigation should be simple and intuitive and not rely too heavily on short-term memory.

The navigation of the website is fundamentally based on the use of mind maps. This format was almost universally preferred by the students as the option that was most easy to navigate. Students particularly liked the combination of images and text and some would navigate websites by icons alone.

A key feature of the design is also the integration of a 'breadcrumb trail'. At the top of each screen is a map, which is fully clickable and allows students to return to any particular screen by clicking on the corresponding image (see Figure 2). This system uses visual memory to help students to navigate the site



Figure 2 Navigation route map

The intention is that the site will be limited to six levels ensuring that students are able to track their progress throughout the site. There will also be a facility for a search engine to allow students to locate specific information.

Colour

Visual stress can result from high contrast combinations between text and background. Text may become unstable and letters may blur or form graphic patterns.

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Key recommendations from the Department of Vision Sciences in Glasgow include:

- use single solid pale colours for backgrounds;
- ensure low contrast between text and background e.g. avoid black/white and red/green;
- preferred background colours are blue, green and pink.

Broadly, consultations with student groups confirmed guidance from the Department of Vision Sciences that individuals differed and choice was essential. At present, the default colour setting of the site is blue as this was generally the preferred option. The site also makes use of a system whereby a user can, at any time, adjust overall colour and contrast using a change settings palate (see Figure 3).

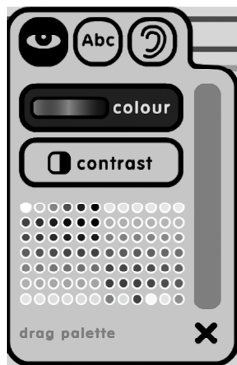


Figure 3 Change settings palate

Currently, everything becomes a tone of the selected colour and any change affects the overall site. The ultimate intention, however, is to develop a solution where it will be possible to adjust colour of background, elements/icons and colour of the text. Any colour combination could then be selected as opposed to one colour of different tonal values.

Audio

The importance of an audio option was confirmed by students in the consultative groups. For reading, some students reported that they would use the audio particularly when tired but others found it a distraction. This emphasised the importance of making the audio

facilities an optional feature of the website. Several audio options were explored and the final decision has been to provide an audio icon which, when selected, will turn on the computer's own speech engine. There will also be a text-based version of the site, which will ensure that it is fully accessible to students using screen readers. Thus, maximum flexibility is provided.

Text and font size

Text should be designed to reduce visual distortion and be easy to read with adequate spacing between characters.

- Size of font should ideally be 14, and 12 at minimum.
- A sans-serif font is preferred, e.g. Arial or Verdana.

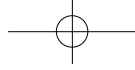
Research confirms that much visual stress disrupting the reading ability of students with dyslexia is due to disturbance from the peripheral visual field, therefore attempts to focus on a 'centre', such as a word or phrase, may be disturbed by the distraction of surrounding visual elements. This can be avoided by visually 'isolating' text, by:

- highlighting;
- placing text within outlined sections;
- double spacing lines of text.

The width of the visual field and 'fixed edges' can also cause disturbance – e.g. the 'fixed edge' of a block of text might place the visual emphasis on the rectangular shape, as opposed to the text. It is therefore advisable to:

- limit the width of blocks of text to 3-4 inches;
- left align all text and do not justify;
- ensure that outlines are curved, not rectangular or square.

The above principles have been applied to the website. The current default font is Vag at size 14 point and students have the option of altering the font type and size. Several projects are currently working on developing fonts specifically for students with dyslexics including



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Natasha French at the Royal College of Art and Rob Hillier at Norwich School of Art and Design. The possibility of including specialist fonts will be explored.

Use of language

As indicated the interpretation of language relies on working memory and the ability to retain information and contextualise text. Chunking information into small sections helps to avoid overloading short-term memory. While students with dyslexia may find it difficult to scan text they do find it helpful if headings enable them to select key information that is useful to them.

Some of the key recommendations include:

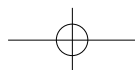
- use short text;
- use concise explanations;
- ensure that there is one key idea per paragraph;
- use headings;
- use bulleted lists;
- provide summary sentences;
- use bold to highlight key points.

(Adapted from Morke & Neilson, 1997)

For the lower levels, where detailed information will be presented, the site will use a system of bulleted topic headings. Students will be able to select a heading and view the corresponding text in a separate box. The text will be scrollable and students will be able to reread and select the section that they would like to consult.

Use of images/icons

The intention is to develop the site using as much visual imagery as possible. This reflects research which suggests the possibility of the dyslexic learning style being predominantly visually based and holistic. Images are used throughout the site to strengthen memory recall. General principles which apply to the use of images include the following:



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- images/icons should be distinct to avoid confusion;
- images should be accompanied by text to indicate meaning;
- a clear space should be maintained around images;
- visual complexity should be avoided.

Currently, images are used as navigational aids and where possible, material will be presented in a visual format with corresponding text.

Overall, a final key concern from the student consultative groups was the request for a strong element of graphic design. This was regarded as essential in a site for art and design students. Students requested that the site should be 'cooler' and less 'corporate'.

Further details are available in the ADC-LTSN website report but the fundamental basis of all of the design principles is the presentation of material in a variety of forms giving the individual user flexibility and choice as to how they access and use the website. Comprehensive student assessment and feedback is now required on progress to date, to inform further refinements.

Future directions

Following attendance at the conference and subsequent to the above research, we have a number of aims:

The first is to consolidate contact with other institutions in the sector, on the basis of interest expressed during the past year. Feedback has focused on the potential of the site as a centralised resource for art and design education which would act to pool and publicise existing resources. The intention, therefore, is to confirm continuing interest and host a networking event in the current year, to determine specific opportunities for collaboration.

The second aim is to focus on the issue of content and begin to complete sections of the site. Reference collaboration, we are specifically interested in the inclusion and transformation of existing resources within the sector but also intend to design new resources with an emphasis on visual formats and student appeal. Ongoing

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design concerns include the politics of inclusion and how to present and publicise the site without alienating its intended audience. In brief, care is needed in the design and description of its function.

Finally, the issue of online design and dyslexia suggests a number of possible directions for future research. We would like to further investigate the nature of student learning styles within art and design, for both students with dyslexia and those without, while the issue of dyslexia and online design also requires further practical field study. Both issues could ultimately have direct implications for the design and presentation of teaching materials within art and design education.

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