

DEVELOPING THE ART ORIENTATED E-LEARNING APPLICATION: LANDSCAPES IN ART

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Design Methodology

Analysis of the Problem

Through the course of collating and processing a literature review, it became clear that developing an online educational artefact for a public institution was not going to be easy. The tricky commission was perceived to be layered with a wealth of considerations, complications and red tape, ranging from the broad target audience to the strict accessibility requirements.

The subject of the artefact itself throws up possibly the greatest problem all. Art History instinctively lacks appeal to the teenage target audience and it was accepted that the majority of potential visitors to the site would not be intrinsically motivated users. For this reason it was judged imperative that the aesthetics of the artefact should be of great importance. It was understood that by providing increased visual appeal and user interest, there was a greater chance of maintaining curiosity and desire with ultimate goal of converting their teacher led extrinsic motivation to that of the formerly mentioned intrinsic genre.

Although the artefact falls under the general subject of Art History, the website essentially has a more acute topic of Landscapes, of which the gallery artefacts are pivotal. This very specific focus naturally results in rather narrow group of users.

Participants

Although the artefact will be used by adults, in particular, Art teachers, the main audience falls within the teenage boundary. The number of teenagers using the internet has grown by over 24% since 2001 and the figures reveal that in 2005, 87% of teenagers are now online (Lenhart, Madden and Hitlin 2005).

It is defined by the client that the participants of the project should essentially be teenagers in Key Stage 3; however the target audience can be focussed further still. Unit 7C, Recreating Landscapes is a Qualifications and Curriculum Authority¹ (QCA) Scheme of Work used to provide guidance and support for the National Curriculum and one which is adopted by a lot of art teachers in the UK. The scheme is usually followed by year 7 students of which the proposed artefact could potentially be of great help. It is envisaged that teachers would direct their students to the site to in order to research key artists, obtain facts about relevant techniques and gain inspiration for their work. From this point it is hoped that students maybe even stimulated to visit one or many of the participating galleries to see the objects in their true glory.

Students following QCA unit 10gen, visiting a museum, gallery or site, will also be important participants of the artefact. These will essentially be GCSE level students who have decided to take Art and Design as one of their elected options. In this unit students are encouraged to visit a site of artistic relevance, potentially the participating galleries of the artefact. The Landscapes in Art website will be an excellent way to prepare for such a visit, providing an introduction to the collections, information about artists, suggestions for classroom activities and much more. Equally the site could be of paramount importance with regard to follow up work including reinforcement and evaluation.

Aside from students, a key group of participants will be the Key Stage 3 teachers themselves. The site will provide invaluable information about the Landscapes

¹ The QCA is a non-departmental public body, sponsored by the Department for Education and Skills (DfES) who regulates and develops the curriculum, assessments, examinations and qualifications.

in Art topic providing content which is not available in such a specific package anywhere else online. This will of course save time and energy when creating lesson plans, developing classroom activities and planning assignments.

Materials

As already established by the brief, the tool used to facilitate this artefact was the World Wide Web (WWW). Due to the nature of the organisation it was imperative that the artefact was freely accessible to the widest audience possible. It was important that the users could access the artefact inside and outside of the school environment without the need of any unusual equipment or technology; this would include those which may not be as common in schools and homes across the country such as handheld computers or GPS devices.

Due to the nature of the project funding, it was also necessary that the artefact had very few running or upkeep costs such burning copies of CD's or staff administration. The WWW was obvious apparatus choice for the artefact as upkeep and management time could be kept to a minimum once the module was complete.

Apparatus Components

The main development of the Landscapes in Art artefact was based essentially upon Extensible HyperText Markup Language 1.0 (XHTML), a family of up-to-date documents that extends HTML 4 and draws upon XML. The World Wide Web Consortium (W3C) adopted this as a recommendation in 2000 with XHTML 1.1 following in 2001.

One of the key benefits of XHTML is that although it is a stricter form of coding, this enables it to support browser compatibility and content transformation. This was considered an essential factor when designing for such a broad audience.

A further benefit of utilising XHTML is to provide evidence of code validation (a contract requirement as shown in Appendix 2). Although it was clearly understood that validation does not prove complete accessibility, it was however, considered an

excellent starting point. In order to get a document to validate a Document Type Definition (DTD) was chosen:

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
```

It was considered that by using the Transitional DTD, the document would conform to the W3C standard, take advantage of presentational features, allow flexibility and at the same time enable backwards compatibility with regards to browsers support. In order to enhance the functionality of the XHTML, it was decided that the use of cascading style sheets (CSS) was essential. Clark (2003) reinforces that style sheets enable the separation of document presentation from the structural mark-up. This is an extremely important feature of accessible web design allowing the page to be customisable according to the users' needs and settings.

A further significant tool in the development of the Landscapes in Art artefact is Flash MX Professional. A conscious decision was made to use this technology where there was a need for extra interactivity and visual appeal. Although there was good awareness of accessibility limitations related to the Flash player it was felt that the benefits far outweighed the costs. The evidence suggests that the teen target audience has specific demands with regard to aesthetics and learning stimulus. Flash allows more emphasis to be placed upon graphical presentation and reduces need to read long passages of text; a theory strongly supported by Terdiman (2005).

Procedure

After receipt and perusal of the initial briefing document, a design contract was formed and agreed by both parties. The document proved to be an excellent way to clarify expectations and requirements from the client. The simple development schedule contained within the contract was also the first step towards project planning as this helped to identify the key milestones within the module.

Research and Development

During this early development phase a client scoping questionnaire was designed and issued to Beth Kingston, the project manager at the Wallace collection. Similarly to the contract, the questionnaire helped to ascertain the client's core objectives for the artefact and also to solidify the goals of the site. It gave the opportunity to pin point concerns with regard to the project outcomes and provided an excellent foundation for the subsequent development. By achieving a clear outline from the client relating the core structure and section requirements it was possible to begin work on an initial concept document along with planning documentation.

As the planning stage progressed it became important to fill in gaps of research that were experienced during the review of literature. At this point it became evident that the area which significantly lacked coverage was the topic of designing for teenagers, namely art students – the key participants of this project. For this reason a questionnaire was developed. It included the call for both qualitative and quantitative data, and had the focus of finding out more about what teenagers were looking for from an education website.

It was decided single packs of 4 questionnaires should be sent to art teachers in selected secondary schools around the UK. The sample of schools was created by looking towards the Local Education Authorities² (LEA's). 72 sample schools across England and Wales were selected ranging in both geographical distribution and performance.

The received questionnaires were collated bearing in mind that the margin of error³ for the relatively small sample was comparatively large. Calculations conducted under the recommendation of Hunter (2006) actually resulted in a margin of error of +- 9.45%.

A summary of the results is given below:

- Positively, 65% of the teenagers questioned had broadband at home with only 8% of those sampled having no access at all.
- The websites teenagers used ranged dramatically across the sample, mainly due to the age and gender variation. The survey revealed the most popular sites at that time to be: MySpace, YouTube, BBC, hotmail, msn, and googleidol. The survey revealed teenagers particularly like TV/soap, fashion, music and sport sites with very few e-learning sites featuring in their 'regularly visit' lists.
- It was revealed that, with regard to school work, students use the internet more to gather research and gathering resources, rather than to look up information at will. This supports the fact that extrinsic motivation is a key usage driver.
- The most important things which teens look for in a website are being easy to use along with containing lots of images and photographs. In addition it should be quick to use, attractive and contain interactive features.
- Lots of text and opportunities to contribute were deemed as least important from the given list.
- Only 12 percent of those questioned had used the computer in an art class before providing evidence that the intended artefact would probably not be used in the class room environment.
- All three suggestions for potential website usage were looked upon positively: looking up information about a particular artist; finding out about a technique and gaining inspiration. Again, research purposes proved to be the most popular.

One of the most fruitful questions asked during the survey was related to finding out what websites teens were using. Interest was taken into what makes them so appealing and what functionality they possess.

During the time spent waiting for the results of all of the questionnaires a competitive analysis was conducted based on existing applications which aim to meet similar learning goals or the identified target audience.

² A Local Education Authority is the part of a local council or authority within England and Wales that is responsible for state education within its jurisdiction.

³ A margin of error indicates the amount of variation which may underlie a survey's results.

A variety of applications were analysed but great attention was paid to publicly accessible, e-learning websites which included; the Wallace Collection Portraits E-learning Module; NGA Classroom for Teachers and Students; Art Explorer and Tate Learning.

Identity and Visual Appeal

Suitable aesthetics was paramount to the success of the website. As recorded by Terdiman (2005) teenagers are not willing to stay around websites with bad presentation no matter how good the content. Working from the previously discussed questionnaire as a source of reference, a list of sites was made which had interesting interfaces and hence required more detailed investigation.

During the review sessions interesting observations and design commonalities were found across the board. Firstly it was noted how image heavy the pages were, graphical images used were usually neatly contained and bordered, with very few blending into the structure of the interface. The pages often mimicked a scrap book style appearance with digital images taking the shape of 'stuck on photographs'. This technique was repeatedly used in many of the researched sites, making an interesting statement about the convergence of new media and a hand crafted techniques.

Similarly a lot interface designs combined crisp borders with highly contrasting rough edges, almost like the effect of torn paper. This helped to give the clean structure a more edgy and modern feel.

A lot of sites made use of dramatic colour schemes helping to create a distinct identity. Very few used the simple white background with numerous designs moving more towards environmental textures and patterns.

Initial and Developed Ideas

Following successful research and the identification of a range of modern trends, a keen start was made on three sample screen designs. These samples were a specific prerequisite of the contract and therefore an important part of the initial design phase.

As expected, opinions and feedback from the various museums were very mixed. It was considered imperative that an overall look and feel was agreed before further progression could be made on the rest of the site development.

Following a review of three initial screen designs it was decided that a final interface design should be produced bearing in mind the array of comments and feedback. After much deliberation a final proposal was agreed. It was concluded that this would take the form of the core interface and navigational structure for the site. However there was still some disagreement between the museum partners as to what image should appear in the background of the header bar.

Typography

From previous research it was noted that teenagers were commonly attracted to rather edgy, rough graphics with regard to core visual elements. For this reason a freeware fontface known as 'Broken' was used for the main headings within the site. It was considered that this would help to set a relaxed and fashionable feel for the artefact and may even surprise the user by contrasting with their possible conservative perceptions towards an art gallery. Due to the nature of the font it used only for large main headings.

For the main body text 'Verdana' was chosen as the dominant font. As well as being easy to read and not as frequently used as Arial, it was felt that this would give the site a clean, fresh and modern feel.

As noted by Nielson (2004), teens don't like small text often because they tend to sit further away from the screen than adult users. Due to this it was important that the text was of a sufficient size and displayed on a clean contrasting background.

Colour Scheme

The development of the site went through numerous stages of colour scheme change. It was important that the visuals would appeal to both male and female users but the scheme also needed to suit the content and not detract too much from the

educational value of the piece. Dark hues of turquoise, purple and blue chosen as the majority of site with text displayed in white providing a good level of visual contrast.

Although green would have been a natural choice for the landscape theme, research proved that this can often cause difficulties for those users with visual impairments.

It was important that this colour scheme was implemented throughout to maintain continuity.

The Vischeck website (www.vischeck.com) was used to simulate how the page would be seen with different types of colour vision including Deuteranope, Protanope and Tritanope. Although it had to be accepted that the colours would appear differently to colour blind users, it was important to choose colours which enable the text and content to still be legible.

Navigation

It was agreed from quite early on that the key navigational links should be:

Home; Themes; Landscapes through Time; History of Landscapes and Gallery. These were the links that should be accessible from any point within the site.

These were initially positioned in a blue navigation bar below the header graphic however it was agreed that due to the header image size, the graphic should only feature on the homepage meaning that when navigating away from this initial screen the navigation bar to jump to the top of the page, potentially quite annoying to some users. Therefore to maintain consistency the navigation bar was positioned at the top on the front page. This move also had a positive knock on effect with regard to accessibility which will be discussed in the next part of the report.

In addition to this main header bar, a consistent footer was applied across the site. This featured five essential links: Accessibility; About this site; Site map; Copyright and Credits. Again these were made

to be 'clickable' from any where on the website as the linked pages in the footer were deemed very important in terms of usability and accessibility. A good example of this is the site map. The W3C (1999) states the importance of providing clear navigation systems and guideline 13.3 they specifically note the importance of providing access to a sitemap as a useful orientation mechanism.

Accessibility Features

The key instrument used to enhance accessibility was the implementation of cascading style sheets (CSS)⁴. It was considered import to keep the structural mark-up and content separate from the visual mark-up and aesthetics of the page. Along with maintaining consistency and improving design efficiency this technique has the added benefit of improving accessibility for a range of users especially those with visual impairments. Users are able to apply their own style sheets with great effect or, if necessary, they can remove the style sheet altogether.

The page layout and structure is entirely controlled by CSS positioning which provides added flexibility and creative opportunities without compromising the accessibility of the site.

Complementing the implementation of cascading style sheets it was also imperative to make use of full use of structural mark-up within the coding of each page. An important element of this was suitable use of headings following the guidelines of the W3C closely.

Headings are important for accessibility because they can help to convey a documents structure. Many assistive technologies use headings for navigation and to skim through the page, it is therefore very important that the headings appear in order i.e. H1 followed by H2 followed by H3 etc.

In numerous instances, graphical representations were used to provide headings for a page. The

⁴ A mechanism for controlling the style of a web page or document without disrupting its structure.

reasoning behind this was because a specific look and feel was desired for the site and it was deemed necessary to make use of a font that quite probably would not be installed on the users system. This technique however could potentially cause problems in terms of accessibility as there is no compliant way to mark an image as a heading and may therefore lead to problems with navigating the content of a page particularly by sound alone.

To overcome this issue, most of the main headings, like the previous example were set as background images and through the use of CSS invisible headings were scripted into the page. This technique allows people using text only browsers or screen readers to follow the structure of the page quickly and succinctly.

Still on the topic of images, it was extremely important that all of the photographs and graphics included in the site were supplemented by an alt tag. Careful choices were made over the content of alt tags and consistency in the naming conventions were attempted to be maintained.

In terms of accessible navigation numerous techniques were embraced. Firstly each of the key links in the navigation bar was supplemented by a unique access key.

Although the keys chosen to represent the links were arranged in a logical manner and accordance to the conventions outlined by the W3C (1999), the user can view the accessibility page (found on the footer of every page) to review the access key assigned to the navigational links.

Referring back to the header and footer navigation bars, a further noted technique was making sure that the links were clearly broken up by something other than just a space. This assures that users with screen readers do not get confused about the end of one link and the start of another. Guidance from the RNIB and W3C led to splitting the main links with the vertical line symbol and also providing additional descriptive titles to supplement the links.

As mentioned previously in this report, careful attention was paid to the use of colour in the web site. The pages were tested in visual variation simulators and there was great awareness of what functionality colour had within the site. Guideline 2 of the W3C Web Content Accessibility Guidelines 1.0 (1999) state clearly that designs should not rely on colour alone to convey information. Where colour is used it should be backed up with other forms of identification. An example of where this technique was put into practice was with the site's gallery section. Here an assortment of thumbnail artefacts can be seen categorised by the museum within which they are contained. The gallery thumbnails contain a colour strip which refers to the relevant museum. This key is indecently supported by a text description to provide an alternative, if not slower processing method.

Flash Accessibility

Although it was understood that the implementation of Flash technology had various unique accessibility issues, it can be argued that its use can in fact make a site more accessible to some individuals. This statement is especially true with regard to users with cognitive or learning disabilities. WebAIM (2006b) suggests numerous benefits of utilizing Flash including: multiple methods of presentation; scalability; keyboard accessibility and higher levels of engagement. However in order to achieve this appealing level of user interaction it was understood that this had to be complimented by assistive support.

Text equivalents were perhaps one of the most dominant accessibility enhancements to the Flash movies. These were considered as very important as screen readers are not able to distinguish graphical element on the movie stage. Each of the buttons on the themes menu were supplemented with a 'Name' and a 'Description'. Other trivial objects pictured on the canvas style menu were made to be 'not accessible' as these would have no particular relevance to a visually impaired user.

Along with providing accessibility descriptions, the accessibility panel also allowed the selection of a tab

order for the various clickable options on a page. It was decided that the buttons should be tabbed in a visual, sequential order and therefore each be given a specific tab index. For example: Landscape places - Tab index 1; Perspective – Tab index 2; Light – Tab index 3; and so on. This method provided enhanced functionality for keyboard users attempting to navigate the site.

In order to consider users with cognitive difficulties careful attention was paid to levels of animation within the interactive parts of the site. Regan (2005) suggests that constant motion on the screen can be very distracting it also may prevent the user from reading the text on the page comfortably. Any sequences of images on the screen enable the user to take control over the using the 1, 2, 3 and 4 buttons labelled clearly on the interface.

Other techniques used to make flash more accessible included:

- Hiding child objects from the screen reader which may cause the page to refresh, hence forcing the reader back to the top of the page.
- Avoiding the use of empty hit areas where possible.
- Providing a range of activities which can be controlled with the keyboard.

However it was accepted in some instances that the user may not want to attempt to navigate or interact with the flash features using methods other than the mouse. For such people a link to a text version of the flash movie is given at the bottom of each page.

For people who do not have the flash player installed or not setup in their browser a piece of JavaScript was used to check for the relevant plug-in. If it is not found the user is redirected to an explanation page which includes a link to the adobe download page along with instructions of how to use the site in the text only mode. A full set of text links are provided for the user in this situation.

User Testing Summary

It was important that at frequent intervals, the site was tested in a variety of browsers and platforms. It was particularly relevant because of the use of CSS.

Each browser handles CSS differently especially where layout and positioning are concerned; therefore tweaks and adjustments were made throughout the creation of the piece.

It was also necessary for the application to be online in order to make use of the Accessible Information Solutions Web Accessibility Tool bar. This is a free downloadable toolbar which embeds into the Microsoft Explorer browser. Tests can then be made on the various pages with regard to elements such as valid code, colour contrast, screen resolution, link checking and disabling the CSS.

It was stated as a necessary requirement within the contract that the site should conform to the WAI Accessibility Guidelines 1.0 Level A and that documentation should be provided for evidence. Although there was great awareness that electronic validation tools have many limitations with regard to proving whether or not a site is accessible it was really the only way to satisfy the clients documentation needs using namely the W3C Validator and WebXACT. All pages comply with the transitional guidelines of the W3C and priority level 1 accessibility with a high a majority compiling with priority level 1, 2 and 3.

The first stage in user consultation took the form of a user questionnaire in which 52 students in the Wallace Collection gallery were asked to use the application and complete an evaluation form. The results were reasonably fruitful. In general children looked positively toward the sites aesthetics. 83% of the children who were asked agreed that the level of appeal to their target age group was either good, very good or excellent although frequent statements were made that the colours and graphics on the site were quite dark.

The greatest problem identified during the questionnaire was its appeal to young boys, although it maybe fair to say that they are notably the most difficult to please and because there was an uneven spread of boy/girl ratio this may have caused a slight imbalance in results.

In order to compliment the questionnaire a strategic interview session was held with a group of 8 teenagers. The testing session lasted approximately a period of 12 minutes each. The first stage of the session was to ask each candidate in turn a series of pre-questions with regard to Landscapes these were essentially based on content found in the themes activity area of the website. This method aimed to analyse what the level of knowledge transfer and attainment was during use of the module.

After completion of the questions the candidate was then settled in front of the application and a think aloud exercise was carried out. To prevent the user from navigating around the site aimlessly they were given a series of simple tasks to complete and requested that they vocalise their thoughts as they attempted to carry them out. The session proved to be very productive an excellent way to identify any problems with navigation or confusing instruction. Following completion of the task, the user was then asked a repetition of the previous 7 questions asked before the think aloud exercise and the results were analysed.

The comparison between their answers was very pleasing. Although the questions were not all answered correctly there was clear change in attitude in the participants. A new found confidence and maturity was evidently felt towards the subject area and students were clearly more willing to elaborate on their answers. Gratifyingly, there was almost a sense of pride in their new knowledge.

Discussion

The results from various stages of user testing led to the identification of specific areas of improvement most of which were raised through the think aloud interviews. This proved to be an excellent way to identify usability issues and in an ideal situation should have involved more users.

As a designer, developing the Landscapes in Art module has certainly been a continual learning experience. Possibly the greatest reason for this was due to the unusual and rather complicated client. Not only was this the one of the largest projects yet to

have been encountered by myself, but also the most prestigious. Over 12 members of staff across the five museums were heavily involved in providing content, feedback and demands towards the artefact. On many occasions it became difficult to find a consensus of agreement when it came to individual design decisions such as which museum should feature on the homepage header bar and which object photos should be implemented. Frequently it was noted that in-house politics were of great significance and often the project manager was forced to take the role as general peace keeper.

The potential target audience for the module was particularly large and this inevitably added to the pressure of making a successful application. Equally, the demand to create a website suitable for almost all users was especially challenging particularly when this was a direct request within the contract and failure to meet this element could have had very serious consequences.

Conclusion

The experience of developing this significant artefact for the Wallace Collection and supporting museums has given me the opportunity to demonstrate my abilities on a more professional level. I feel that I have learnt a lot about project management techniques and how important it is to be thoroughly organised from the beginning especially with regard to the large amount of content arriving from different people. As whole I am very satisfied by progress I have made as a designer within a corporate market. The client was extremely happy with the final piece and since the launch of the website plans have been made to begin work on a new e-learning module for the Museum Network which I found to be the perfect gratification for my labour.

References

- Clark, J. (2003). Building accessible website. USA. New Riders Publishing
- Hunter P (2006) Margin of Error and Confidence Levels Made Simple. Retrieved August 02, 2006, from <http://www.isixsigma.com/library/content/c040607a.asp>

Lenhart, A., Madden, M. and Hitlin, P. (2005).
Teens and Technology: Youth are Leading the
Transition to a Fully Wired and Mobile Nation.
Retrieved May 29, 2006, from
[http://www.pewinternet.org/PPF/r/162/report_display
.asp](http://www.pewinternet.org/PPF/r/162/report_display.asp)

Neilson, J. (2005). Usability of Websites for
Teenager. Retrieved June 04, 2006, from
<http://www.useit.com/alertbox/20050131.html>

Regan (2005) Best Practices for Accessible Flash
Design Retrieved June 04, 2006, from
[http://www.adobe.com/resources/accessibility/best_
practices/best_practices_acc_flash.pdf](http://www.adobe.com/resources/accessibility/best_practices/best_practices_acc_flash.pdf)

Terdiman, D. (2005). What Websites Do to Turn On
Teens. Retrieved June 02, 2006, from
[http://www.wired.com/news/culture/0,1284,66514,00
.html](http://www.wired.com/news/culture/0,1284,66514,00.html)

W3C (1999) Checklist of Checkpoints for Web
Content Accessibility Guidelines 1.0 Accessed on
February 28th, 2006 from
[http://www.w3.org/TR/WAI-WEBCONTENT/full-
checklist.html](http://www.w3.org/TR/WAI-WEBCONTENT/full-checklist.html)

WebAim(2006) Designing for Screen Reader
Compatibility Retrieved June 04 2006, from
<http://www.webaim.org/techniques/screenreader/>

WebAim(2006b) Creating Accessible Macromedia
Flash Content Retrieved June 04 2006, from
<http://www.webaim.org/techniques/flash>